Observer Reference Guide

September 2003

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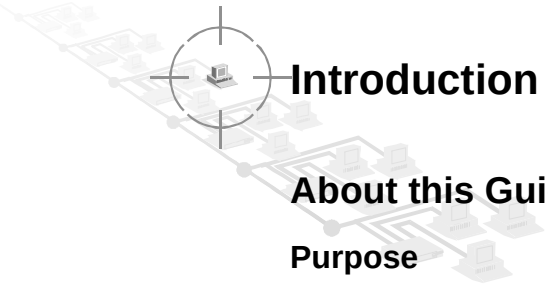


Introduction

About this Guide

Purpose

The Observer Reference Manual comprehensively describes every menu option, mode, tool and setup dialog in the Observer protocol analyzer. It is intended as a companion to *Installing and Using Network Instruments Observer*, which is more task-oriented, providing tutorials and examples. The content of both manuals is available in Observer's online help system.

Intended Audience

This guide is for experienced computer users who are familiar with Microsoft Windows, TCP/IP networking, and protocol analysis concepts.

Document Conventions

When this document displays a menu path such as **File**->**Save...**, it means that you should choose **Save...** from the **File** menu.

Variables are shown in *italic type*. For example, when the manual states that "The format of address entries in a .ali file is *MACaddress alias*," it means that you must supply the actual MAC address and alias pairs in that particular order.

Things to Note

- Observer is shipped with default global options such as: general configuration options, email options, pager options, and SNMP options (if you have purchased the SNMP Suite). To change any of these options, go to Options > Observer General Options.
- Right-click menus are available throughout Observer. To quickly locate and execute a command, just right-click and a menu will be displayed.
- Some modes are available in both non-switched and switched modes. Any notes for operating the mode in a switched environment are documented along with the mode.

Installing Observer

System Requirements

Windows PC requirements: Pentium 400 or better with 256MB minimum RAM, 512MB recommended. **Display:** SVGA running at least 800x600. **Operating System:** Windows 2000 or XP.

Licensing Observer

Observer is always distributed and sold in a demo version. The demo mode is provided so that a potential Observer user can get a feel for the package without having to purchase it. You can turn a demo version of Observer into a licensed version with an identification and license number, as described below. Additionally, depending on which Console you have purchased, your license numbers may activate any one, several, or all of the available Observer Management Consoles.

Demo mode has two options:

- Demo data simulation—Observer simulates network traffic and does not require a network or network hardware to be present.
- Time limited—Observer's Packet Capture mode captures live network data for five seconds, and the statistics modes function and display your network data for one minute.

The identification and license numbers are unique and can only be used for one copy of Observer, and will work for only one copy of Observer. The license number will "turn on" the Observer demo, converting it to an actual Observer which provides complete functionality.

To turn the demo version of Observer into a fully-functioning licensed version, you will need to fill out the license dialog with your name (or department) and your company name to generate your unique customer identification number. To display the license dialog, choose **File > License Observer** from the main Observer window.

Once the licensing information has been filled out, you will need to fax your company identification number (and possibly arrange for payment depending upon how you purchased Observer) to Network Instruments to receive your license number. The license number will turn your demo copy of Observer into a fully functioning copy of Observer.

Network Instruments' fax numbers are:

- (952) 932-9545 in the US and outside of Europe, and
- +44 1959 569881 in Europe and the UK.

Depending on where and how you purchased Observer, you may have a "Right to Use" (RTU) certificate or a set of activation numbers document. Follow the instructions on the RTU or the activation number document to license Observer.

Quick Installation Overview

> If you're very familiar with installing programs under Microsoft Windows, you can use this section for instructions on how to install Observer on your PC. If in doubt, skip to the step-by-step instructions for the operating system you are using.

Installing Observer is straightforward: Just run the setup program. Observer can be installed either from the Observer CD or from the Internet.

> Network Instruments recommends that those users with Internet access download Observer from the Network Instruments' Web site; the version published on the Web site is the latest release.

Either:

- Download the demo from the Network Instruments' ftp site at ftp://ftp.networkinstruments.com/pub/demos/obsdemo.exe, or
- Run the Observer installation program from Windows by putting the Observer CD in your CD drive and following the instructions on the screen.

Quick Install

> If you are upgrading Observer from a previous release, you need not unininstall the existing version before you install the upgrade.

1. Setup will ask you to choose a language; select your preferred language and click on the **Next** button.
2. Setup will ask if you want to install Observer, an Advanced Probe, or a RMON Probe. Select "Observer" and click on the **NEXT** button.
3. Setup will ask you which directory you would like Observer installed into.

   > Unless you have a specific reason to install Observer elsewhere, we suggest that you install Observer in the default destination.

4. Check the README.WRI for any late-breaking installation information.

Running Observer or a Probe

You must reboot your PC before you can run Observer (or a Probe). Once rebooted, you can run Observer or the Probe by double-clicking on the Observer icon in the Observer group or the (Advanced or RMON) Probe icon from the Network Instruments' (Advanced or RMON) Probe group.

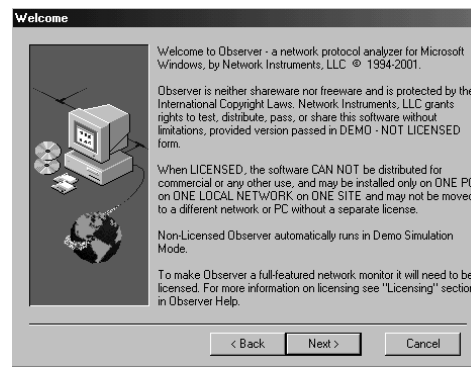
Step-by-Step Installation Instructions

This describes installing a licensed version of Observer using Microsoft Windows 2000/XP:

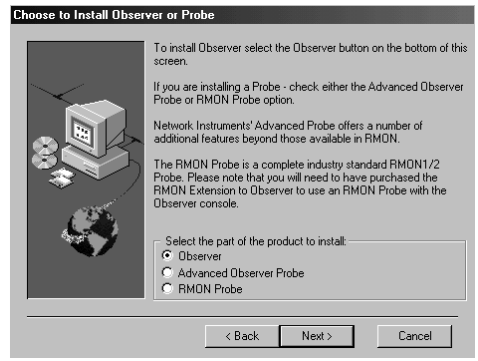
Copy the Observer Files to the Windows PC

1. Start Windows 2000/XP and choose File > Run.
2. In the Run dialog box, fill in the path to the executable SETUP.EXE (typically [your CD drive]:\SETUP.EXE).
3. The initial setup dialog box will ask you to select the installation language.

4. The **Welcome** dialog will be displayed. By clicking on the NEXT button, you are agreeing to the license terms.


Welcome
Welcome to Observer - a network protocol analyzer for Microsoft Windows, by Network Instruments, LLC © 1994-2001.
Observer is neither shareware nor freeware and is protected by the International Copyright Laws. Network Instruments, LLC grants rights to test, distribute, pass, or share this software without limitations, provided version passed in DEMO - NOT LICENSED form.
When LICENSED, the software CAN NOT be distributed for commercial or any other use, and may be installed only on ONE PC on ONE LOCAL NETWORK on ONE SITE and may not be moved to a different network or PC without a separate license.
Non-Licensed Observer automatically runs in Demo Simulation Mode.
To make Observer a full-featured network monitor it will need to be licensed. For more information on licensing see "Licensing" section in Observer Help.
< Back
Next >
Cancel

5. Next, setup will ask if you want to install Observer, Advanced Probe, or RMON Probe. Select Observer.


Choose to Install Observer or Probe
To install Observer select the Observer button on the bottom of this screen.
If you are installing a Probe - check either the Advanced Observer Probe or RMON Probe option.
Network Instruments' Advanced Probe offers a number of additional features beyond those available in RMON.
The RMON Probe is a complete industry standard RMON1/2 Probe. Please note that you will need to have purchased the RMON Extension to Observer to use an RMON Probe with the Observer console.
Select the part of the product to install:
Observer
Advanced Observer Probe
RMON Probe
< Back
Next >
Cancel

6. Setup will ask where to copy the Observer files. Unless you have a specific reason to install Observer elsewhere, we suggest that you install Observer in this default destination.

Choose destination location
Setup will install the files in the following directory.
To install to this directory, click Next.
To install to different directory, click Browse and select another directory.
Destination directory:
C:\Observer Files
Browse...
< Back
Next >
Cancel

7. Setup will copy the Observer files onto your PC.

Probe Installation

For instructions on Probe installation, see the Network Instruments' Probe manual.

Ethernet Errors By Station and NIC Driver Installation

To view and process Ethernet station errors, Observer requires that you use a driver for your network adapter card that has been modified to pass error packets to the Observer application.

> Normally, NDIS drivers only keep track of the number of error packets seen on a network. The NDIS driver does not process or pass the error

packet in any way. Without some way of passing error packets up to the operating system or application, there is no way for the operating system or application to obtain information about the source and nature of the errors.

Network Instruments has worked with a number of card manufacturers to modify the standard network card NDIS driver so that it will maintain error counts, and pass error packets up to Observer for processing. Observer ships with a number of these ErrorTrak™ drivers. They are located in the Drivers directory on the distribution media, and are installed to the [usually C:] \Observer Files\Drivers directory during the installation process.

The Network Instruments' ErrorTrak™ drivers are modified standard drivers and work just as the standard driver do, with the one addition that error packets are passed to Observer.

Please check the Network Instruments' Web site for more information on supported network adapter cards:

- **PCMCIA adapters**
  http://www.networkinstruments.com/html/osup1001.html
- **ISA and PCI adapters**
  http://www.networkinstruments.com/html/osup1002.html

Installing ErrorTrak™ Drivers under Windows 2000/XP

1. Open **Start > Settings > Control Panel > System > Hardware > Device Manager.**
2. From the Device Manager tree, open Network adapters and double-click on the entry for your adapter card.
3. Choose the Driver Tab and click the UPDATE DRIVER... button.
4. This will start the Update Device Driver wizard. Select the SEARCH FOR A SUITABLE DRIVER FOR MY DEVICE option button and click NEXT.
5. From the next dialog, check the SPECIFY A LOCATION button. Click NEXT.
6. From the next dialog, browse to the C:\Observer Files \Drivers\CARD_TYPE\Win2000 directory (where "CARD_TYPE" is the chip set that you are using—e.g. Intell21143 for NIC cards using the Intel 121143 chip set).
7. Select the NET2000.INF file and click NEXT. Windows 2000/XP will update the driver.

Please check the Network Instruments' Web site for more information on supported network adapter cards:

- **For ISA and PCI adapters**
  http://www.networkinstruments.com/html/osup1001.html

- **For PCMCIA adapters**
  http://www.networkinstruments.com/html/osup1002.html

Wireless NIC Driver Installation

For Observer to properly analyze wireless packets, the driver must pass through *all* of the packets, not just those packets addressed to that NIC (i.e., it must put the card in 'promiscuous' mode). Observer must also have access to the 'raw' wireless packets.

Because standard wireless drivers do not support either raw *or* promiscuous mode, NI has written a custom driver so that you can use Observer as a wireless protocol analyzer.

Before you install the driver, you must:

- Verify that the NIC is operating correctly with the *manufacturer-supplied driver* as described in the manufacturer's installation instructions. After you've made sure your hardware is functioning, uninstall the manufacturer's software.
- Install Observer. See "Step-by-Step Installation Instructions" on page 5. You must install Observer so that you can update the NIC driver from the Observer directory.

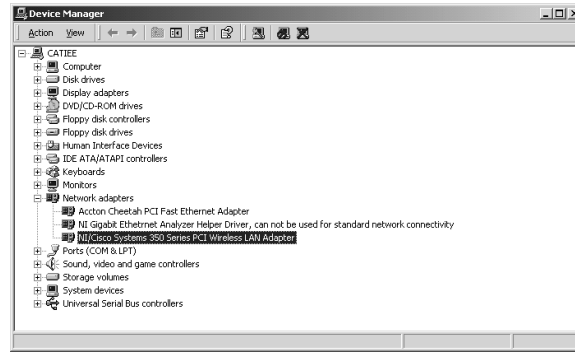
Important Note For Atheros combo card users:

Do **not** use Windows to configure your wireless network settings such as SSID and WEP keys. Use the Network Instruments/Atheros 802.11 Client Utility (installed in your Observer Program Group along with Observer) instead. To turn off Windows wireless configuration, right-click on the network connection and choose **Properties**. Click on the Wireless Networks tab and make sure that the **Use Windows to configure my wireless network settings** checkbox is left unchecked. See step 12 of this installation procedure for details.

To update the driver, follow these steps:

1. Right-click on the 'My Computer' icon and choose **Properties**.

2. Click the **Hardware** tab and then the **Device Manager...** button to display the Device Manager:



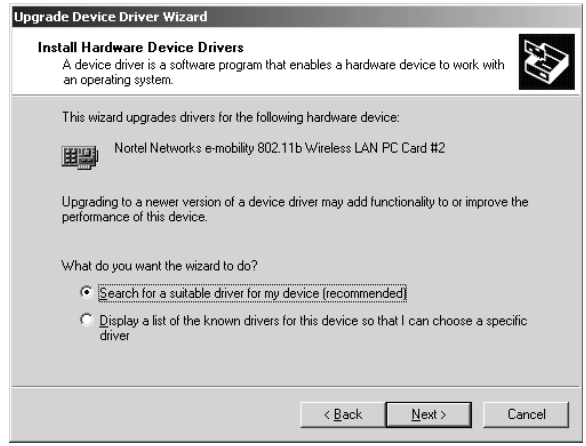
3. Right-click on the wireless driver (e.g. Nortel Networks e-mobility) and choose **Properties**.

4. Click on the **Driver** tab and then click the **Update Driver...** button. This starts the Update Hardware Wizard:

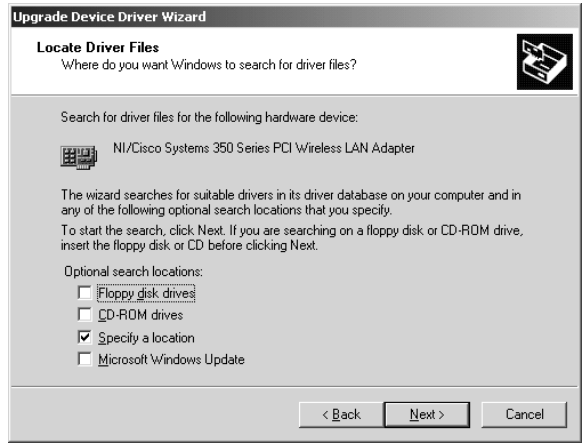
Upgrade Device Driver Wizard
Welcome to the Upgrade Device Driver Wizard
This wizard helps you upgrade a device driver for a hardware device.
To continue, click Next.
< Back
Next >
Cancel

5. Click **Next**.

   The Wizard asks you how you want to update the driver:

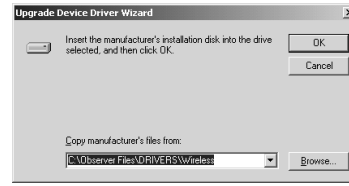

Upgrade Device Driver Wizard
Install Hardware Device Drivers
A device driver is a software program that enables a hardware device to work with an operating system.
This wizard upgrades drivers for the following hardware device:
Nortel Networks e-mobility 802.11b Wireless LAN PC Card #2
Upgrading to a newer version of a device driver may add functionality to or improve the performance of this device.
What do you want the wizard to do?
Search for a suitable driver for my device (recommended)
Display a list of the known drivers for this device so that I can choose a specific driver
< Back
Next >
Cancel

6. Choose “Search for a suitable driver for my device (recommended)” and click **Next**. The Wizard asks where you want to search for the driver:


Upgrade Device Driver Wizard
Locate Driver Files
Where do you want Windows to search for driver files?
Search for driver files for the following hardware device:
NI/Cisco Systems 350 Series PCI Wireless LAN Adapter
The wizard searches for suitable drivers in its driver database on your computer and in any of the following optional search locations that you specify.
To start the search, click Next. If you are searching on a floppy disk or CD-ROM drive, insert the floppy disk or CD before clicking Next.
Optional search locations:
Floppy disk drives
CD-ROM drives
Specify a location
Microsoft Windows Update
< Back
Next >
Cancel

7. Choose “Specify a location” and click **Next**.

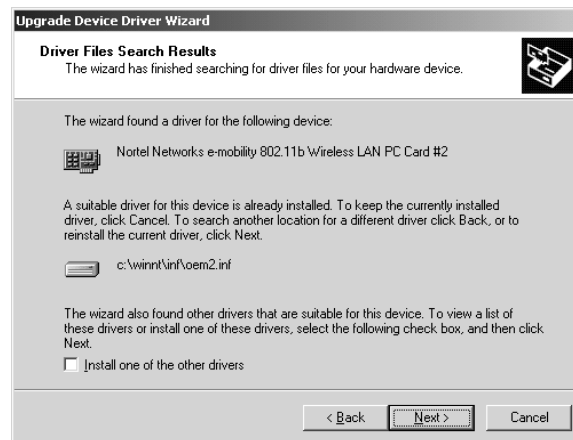
A file locator dialog is displayed:



8. Enter (or browse to) the following directory (assuming that **C:\Observer Files** is your Observer directory):

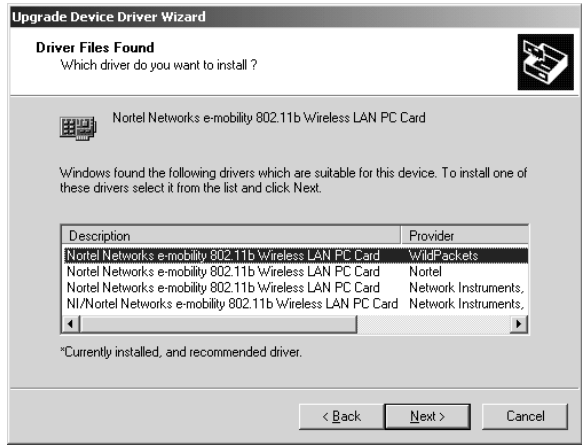
   `C:\Observer Files\drivers\wireless`

   The Wizard displays the following:


Upgrade Device Driver Wizard
Driver Files Search Results
The wizard has finished searching for driver files for your hardware device.
The wizard found a driver for the following device:
Nortel Networks e-mobility 802.11b Wireless LAN PC Card #2
A suitable driver for this device is already installed. To keep the currently installed driver, click Cancel. To search another location for a different driver click Back, or to reinstall the current driver, click Next.
c:\winnt\inf\oem2.inf
The wizard also found other drivers that are suitable for this device. To view a list of these drivers or install one of these drivers, select the following check box, and then click Next.
Install one of the other drivers
< Back
Next >
Cancel

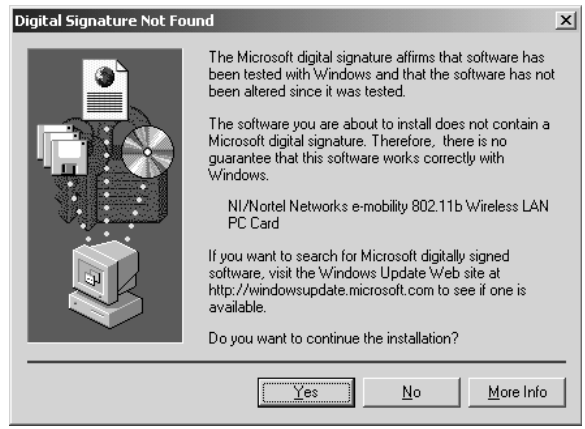
9. Choose “Install one of the other drivers” and click **Next**.

The wizard displays a list of compatible drivers:


Upgrade Device Driver Wizard
Driver Files Found
Which driver do you want to install ?
Nortel Networks e-mobility 802.11b Wireless LAN PC Card
Windows found the following drivers which are suitable for this device. To install one of these drivers select it from the list and click Next.
Description
Provider
Nortel Networks e-mobility 802.11b Wireless LAN PC Card
WildPackets
Nortel Networks e-mobility 802.11b Wireless LAN PC Card
Nortel
Nortel Networks e-mobility 802.11b Wireless LAN PC Card
Network Instruments,
NI/Nortel Networks e-mobility 802.11b Wireless LAN PC Card
Network Instruments,
*Currently installed, and recommended driver.
< Back
Next >
Cancel

10. Choose the appropriate analyzer driver with the “NI” prefix (“NI/Nortel Networks e-mobility 802.11b Wireless network PC Card,” for example) and click **Next.***

    The Wizard informs you that the driver lacks a Microsoft digital signature:


Digital Signature Not Found
The Microsoft digital signature affirms that software has been tested with Windows and that the software has not been altered since it was tested.
The software you are about to install does not contain a Microsoft digital signature. Therefore, there is no guarantee that this software works correctly with Windows.
NI/Nortel Networks e-mobility 802.11b Wireless LAN PC Card
If you want to search for Microsoft digitally signed software, visit the Windows Update Web site at http://windowsupdate.microsoft.com to see if one is available.
Do you want to continue the installation?
Yes
No
More Info

11. Click **Yes**. Network Instruments has tested the driver and verified that it works with Windows and with Observer. When the installation is complete, click **Finish** to close the Wizard.

    Note that you can switch wireless operation between analyzer (i.e., “promiscuous”) mode and standard NIC mode without re-installing the driver.

*The table below shows what driver to select for each of the supported wireless NICs:

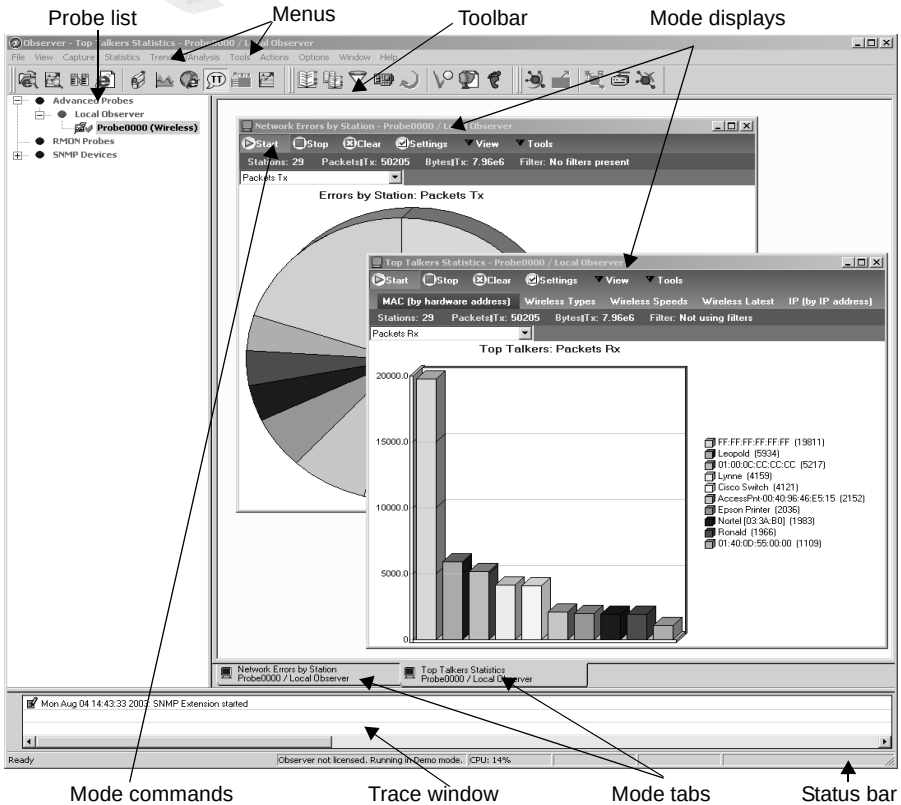
NIC	Analyzer Driver
Symbol Spectrum24 - 41x1 models	NI/Symbol LA-41x1 [or 41x3] Spectrum24 Wireless network PCMCIA [or PCI] Card Driver
Nortel 41x1 models	NI/Nortel Networks e-mobility 802.11b Wireless network PC [or PCI] Card Driver
Cisco Aironet 340-350 series models	NI/Cisco Systems 340 [or 350] Series PCMCIA [or PCI] Wireless network Adapter
Intel 2011b models	NI/Intel® PRO/Wireless [or PRO/11 Wireless] 2011 network PC [or PCI] Card Driver
Proxim Harmony and Skyline models	NI/Atheros Based 802.11a Wireless Network Adapter
Atheros Based AR5001 Combo Cards	NI/Atheros Based 802.11a/b (or a/b/g) Wireless Network Adapter

Network Instruments Hardware Probes and Systems

Network Instruments offers dedicated hardware kits, probes, and turnkey analyzer systems to analyze high-traffic gigabit Ethernets and WAN links. Visit networkinstruments.com to see a current list of hardware options. Refer to the relevant Network Instruments hardware *Installation and Quick Start Guide* for installation and operational details.

Main Observer Display

The main Observer display includes a number of display components that can be docked or free floating. Most display areas can be configured to be displayed or hidden. Right-clicking on most display areas will offer a display configuration menu.



Please note that Observer's main display may vary depending on which functionality features for Real-Time Expert you have installed and on which views you have selected from the View menu.

Observer Basics

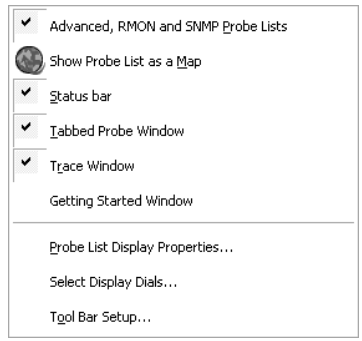
Observer Menus

File Menu

- License Observer—when Observer is not licensed, this displays the Licensing dialog. If Observer is licensed, the relicense (upgrade) dialog will be displayed with your current identification and license number. If Observer is licensed, you will be prompted to relicense your copy of Observer.
- Select Menu Language—allows you to select a language in which Observer menus will be displayed. Once you select a different language, you will be prompted to restart Observer before the changes will take effect.
- Print Probe List—allows you to print a list of currently-available Probes.
- Print Trace Window—allows you to print the current trace window.
- Print Setup—allows you to configure printers for use with Observer.
- Save Current Observer Configuration—saves the current Observer configuration, including window position and open modes.
- Load Comma Delimited File—allows you to load a previously saved statistics comma delimited file. For example, if you load a Vital Signs data file, the saved (comma delimited) information will be displayed using Observer's Vital Signs mode display.
- Save Mode in Comma Delimited File—allows you to save the current statistical modes data in comma delimited format.

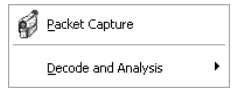
- Load and Analyze Observer Capture Buffer—allows you to load a previously saved packet buffer for analysis by the Decode and Analysis submode of Packet Capture mode.
- Save Observer Capture Buffer—allows you to save the present capture buffer in Observer (.BFR) format.
- Save Decode as Text—allows you to save the present decode as a text file.
- Exit—exits Observer.

View Menu



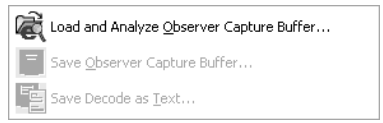
- Advanced, RMON and SNMP Probe lists—this toggles the left hand display of the list of Probes. If you have either the SNMP or RMON management consoles, these will also be displayed in the Probe list. When checked, the Probe list is available for display. The Probe list display will show all active and nonactive registered Probes.
- Show Probe List as a Map—when selected, Observer displays the list of Probes in the map (versus list) format.
- Status Bar—toggles the display of the status bar.
- Tabbed Probe Window—when selected, the workbook tabs (showing each Observer, SNMP, or RMON mode) are displayed at the bottom of each Probe's main display area. Unchecking removes the workbook tabs from the display. Clicking on a workgroup mode tab will set focus on that mode.
- Trace Window—when selected, the Probe trace window is displayed at the bottom of the main Observer window. The Probe trace window shows all Probe-Observer communication. Unchecking removes the trace window from the display.
- Getting Started Window—when selected, shows the Getting Started Window, which helps new users with tips and a simplified interface.
- Probe List Display Properties—displays the Probe List Display Properties dialog.
- Toolbar Setup—displays the Toolbar Setup dialog. See "Toolbar Setup – Toolbars Tab" on page 27.

Capture Menu



- Packet Capture—displays the Packet Capture mode.
- Decode and Analysis—displays the Decode and Analysis submode.

Decode and Analysis Submode Menu



- Load and Analyze Observer Capture Buffer—allows you to load a previously saved packet buffer for analysis by the Decode and Analysis submode of Packet Capture mode.
- Save Observer Capture Buffer—allows you to save the present capture buffer in Observer (.BFR) format.
- Save Decode as Text—allows you to save the present decode as a text file.

Statistics Menu

- Activity Display—displays the Activity Display mode for the current network types. See “Network Activity Display” on page 88.
- Bandwidth Utilization—displays the Bandwidth Utilization mode. See “Bandwidth Utilization” on page 69.

- Efficiency History—displays the Efficiency History mode. See “Efficiency History” on page 73.
- Errors by Station—displays the Ethernet/Token Ring/FDDI Errors By Station mode. See “Network Errors by Station Mode” on page 93.

  The window’s title, when the mode is displayed, will display the type of network—e.g., Ethernet, FDDI, or Wireless.

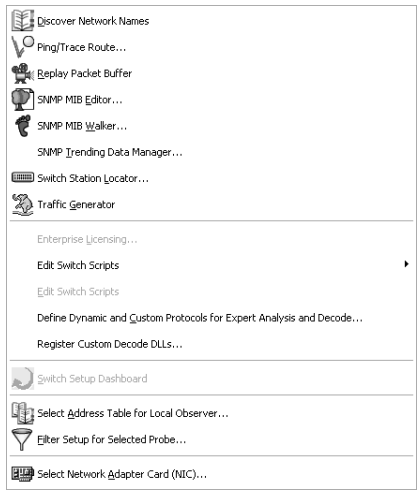
- Internet Observer (IP Matrix)—displays the Internet Observer mode. See “Internet Observer Mode (Internet Patrol, Pairs Matrix, IP Subprotocols)” on page 76.
- Pair Statistics (Matrix)—displays the Pair Statistics (Matrix) mode. See “Pair Statistics (Matrix) Mode” on page 105.
- Protocol Distribution—displays the Protocol Distribution mode. See “Protocol Distribution Statistics Mode” on page 112.
- RMON Tables—displays RMON Tables; only active if you have selected an RMON probe.
- Router Observer (or Access Point Load Monitor when in wireless mode)—displays the Router Observer mode. See “Router Observer” on page 115.
- Size Distribution Statistics—displays the Size Distribution Statistics mode. See “Packet Size Distribution Statistics Mode” on page 122.
- Summary—displays the Network Summary mode. See “Network Summary” on page 165.
- Top Talkers Statistics—displays the Top Talkers Statistics mode. See “Top Talkers Statistics Mode” on page 125.
- Utilization History—displays the Utilization History mode. See “Utilization History Mode” on page 132.
- Utilization Thermometer—displays the current-time utilization in a graphic display similar to a thermometer. See “3D Step Chart View” on page 136.
- Vital Signs—displays the Network (Ethernet/Token Ring//FDDI/Wireless/Frame Relay) Vital Signs mode. See “Network Vital Signs Mode” on page 95.
- Web Observer—displays the Web Observer mode. See “Web Observer” on page 137.
- Wireless Access Point Statistics—displays statistics on traffic passing through any Access Points (APs) visible to the Observer wireless NIC. See “Wireless Access Point Load Monitor” on page 141.
- Wireless Channel Scan Monitor—starts the Wireless Channel Scan Monitor. See “Wireless Site Survey” on page 144.

- Triggers and Alarms—displays the Triggers and Alarms mode. See “Triggers and Alarms Mode” on page 148.

Trending/Analysis Menu

- Network Trending—displays the Network Trending mode.
- Start Network Trending Viewer—starts the Network Trending viewing console.
- Start Web Browser Report—displays the Web Publishing Service window.
- Application Analysis—displays the Application Analysis Mode, which shows how various types of servers are performing.
- Load and Analyze Observer Capture Buffer—allows you to load a previously saved packet buffer for analysis by the Decode and Analysis submode of Packet Capture mode.
- WAN Delay Analysis—displays the WAN Delay Analysis Mode.

Tools Menu



- Discover Network Names—displays the Discover Network Names mode. This is where you can automatically discover your hard network addresses and alias the hard addresses to names.

- Ping/Trace Route—opens the Ping/Trace Route window.
- Replay Packet Buffer—displays the Replay Packet Buffer mode.
- SNMP MIB Editor—displays the SNMP MIB Editor.

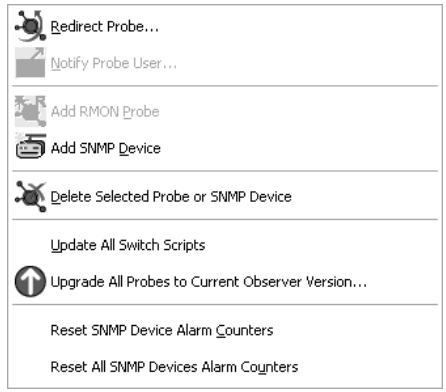
  To display SNMP MIB Editor you will need to purchase Network Instruments' Observer Suite.

- SNMP MIB Walker—displays the Walk Agent MIB dialog, permitting the user to examine an SNMP Agent in detail.

  To display SNMP agent information you will need to purchase Network Instruments' Observer Suite.

- SNMP Trending Data Manager—displays the SNMP Trending Data Manager dialog.
- Switch Station Locator—displays SNMP-generated list of MAC addresses for every port on a switch.
- Traffic Generator—displays the Traffic Generator dialog.
- Enterprise Licensing—displays the Enterprise Licensing dialog.
- Edit Switch Scripts—displays the Edit Switch Scripts submenu.
- Define Protocols for Protocol Distribution Statistics—displays the setup properties for Protocol Distribution.
- Import/Export Filter Presets—displays the Import/Export Filter Presets submenu.
- Register Custom Decode DLLs—displays the Register Custom Decode DLLs dialog.
- Switch Setup Dashboard—displays the switch dashboard. This dialog is where all switch specific configuration is done within Observer.
- Select Address Table for Local Observer—this displays the dialog to select the address table for local Observer.
- Filter Setup for Selected Probe—displays the Filters dialog for the currently active Probe. If you are using Observer to monitor the local segment, this is the filters dialog for the local segment. If you are using a Probe with Observer, this dialog will display the filter for the currently active Probe.
- Select Network Adapter Card (NIC)—displays the change adapter dialog. This item is available only on a system with multiple adapters.

Actions Menu

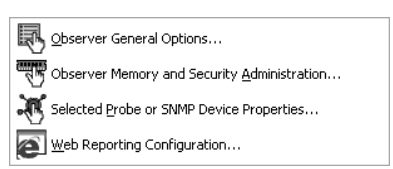

Redirect Probe...
Notify Probe User...
Add RMON Probe
Add SNMP Device
Delete Selected Probe or SNMP Device
Update All Switch Scripts
Upgrade All Probes to Current Observer Version...
Reset SNMP Device Alarm Counters
Reset All SNMP Devices Alarm Counters

- Redirect Probe—displays the Probe Redirection dialog. Redirecting a Probe lets the Observer console connect and direct a Probe's data to either the local Observer console or a (different) remote Observer console.
- Notify Probe User—activates the Observer console-to-Probe chat utility.
- Add RMON Probe—displays the dialog to add either a Network Instruments' RMON Probe or a third-party RMON Probe.
- Add SNMP Agent—if the SNMP Extension is installed, this displays the dialog to add an SNMP Agent to those Observer is already monitoring.

  To display SNMP agent information you will need to purchase Network Instruments' Observer Suite.

- Delete Selected Probe or SNMP Device—deletes the selected Probes from the Probe list.
- Update All Switch Scripts—sends all updated switch scripts to any Probes that are using switch scripts.
- Upgrade All Probes to Current Observer Version—upgrades your probes to the same version of software that Observer is running.
- Reset SNMP Device Alarm Counters—resets the SNMP device alarm counters.
- Reset All SNMP Devices Alarm Counters—resets all SNMP device alarm counters.

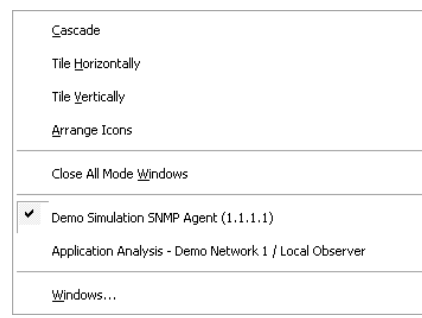
Options Menu


Observer General Options...
Observer Memory and Security Administration...
Selected Probe or SNMP Device Properties...
Web Reporting Configuration...

- Observer General Options—displays the Observer General Options dialog. These options include general Observer options and options for email and pager notification, as well as SNMP general configuration information.
- Observer Memory and Security Administration—displays the dialogs that let you set up users and passwords, and configure memory usage of Observer and Probes.
- Selected Probe or SNMP Device Properties—displays the Probe Options dialog, including Probe settings and Probe parameters (displays the current network adapter information from the perspective of Observer's driver). See "Selected Probe or SNMP Device Properties" on page 257.
- Web Reporting Configuration—if Observer is licensed for the Web Extension, this item will display the Web Extension configuration.

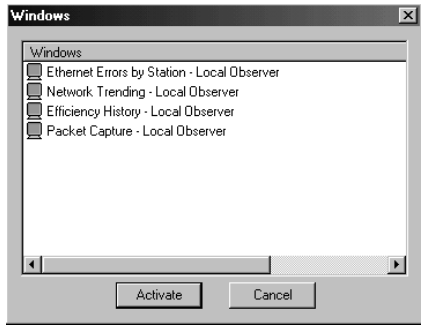
> To display Web reporting information you will need to purchase Network Instruments' Observer Suite.

Window Menu



- Cascade—displays the standard Windows cascade option.
- Tile Horizontally—displays the standard Windows tile horizontally option.
- Tile Vertically—displays the standard Windows tile vertically option.
- Arrange Icons—arranges any iconified windows at the bottom of the display.
- Close All Mode Windows—closes all (current Probe) open mode windows.
- Display of all open modes (in this menu Packet Capture, Bandwidth Utilization, and Internet Observer modes are open).

- Windows—opens the Windows dialog that displays all open modes.



Help Menu

- Contents—displays the Help files contents.
- Search Help—displays the Help system word search function.
- How to Use Help—displays Help information on Windows help.
- About Observer—displays the Observer "About" dialog, which includes version numbers, licensing status information, and a list of the Extension(s) that Observer is licensed for.

Observer Toolbars

By default, Observer displays three toolbars: Modes, Settings, and Actions. Observer's toolbars can be customized. See "Customizing Toolbars" on page 27.

Start Modes Toolbar

Each of Observer's modes are accessible through the main menu display. Some modes are accessible via the Start Modes toolbar.

Mode icons are described below.

	Load and Analyze Observer Capture Buffer
	Start Network Trending Viewer

	WAN Delay Analysis
	Start Web Report
	Packet Capture
	Bandwidth Utilization
	Internet Observer
	Top Talkers Statistics
	Protocol Distribution
	Network Trending

Settings Toolbar

You can decide the look of certain mode views and you can choose the general settings of Observer.

Each of Observer's settings is accessible through the toolbar menu or the icons on the toolbar.

	Discover Network Names
	Local Address Table Select
	Probe Filter Setup
	Select Network Adapter
	Switch Dashboard Setup
	Start Ping/Trace Route Utility
	Show MIB Editor
	Walk Agent MIB

Actions Toolbar

Each icon launches a certain action.

Actions are described below:

	Redirect Probe
	Notify Probe user—when connected to a remote Probe.
	RMON Probe Configuration
	Network Device Properties
	Delete Probe(s)

Mode Commands Toolbar

All of Observer's modes share some common buttons on the toolbar located at the top of each display window. Each icon's function is listed below.

	Start capturing packets or statistics.
	Stop capturing packets or statistics without clearing the display.
	Stop capturing packets or statistics and clear the display.
	Select from one of the available views, which differ according to the current mode:
	View decoded packets
	Displays the Tools menu, from which you can Save, Print, and change display Properties such as colors and graph styles.

Toolbar Setup

You can customize Observer toolbars, which will allow you to quickly move from mode to mode without the need to navigate the menu system. You can also easily restore the default toolbars. See "Customizing Toolbars" on page 27.

Moving Buttons

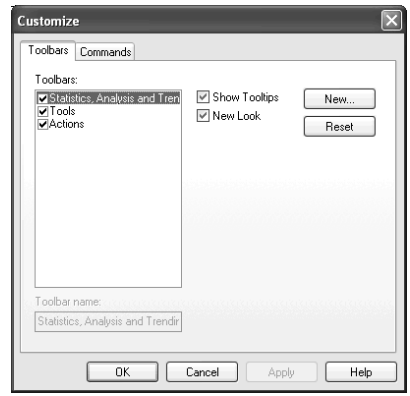
To move buttons from the main Observer display, drag the button and drop it in the desired location while holding down the Alt key.

Deleting Buttons

To delete a button, drag the button from the toolbar while holding the Alt key and drop it anywhere except on a toolbar.

Customizing Toolbars

To start a configuration session, select View > Tool Bar Setup. The **Customize** dialog will be displayed.



Toolbar Setup – Toolbars Tab

Toolbars checkboxes—check any box to display the corresponding toolbar; uncheck a box to hide the toolbar:

- Statistics, Analysis and Trending
- Tools
- Actions

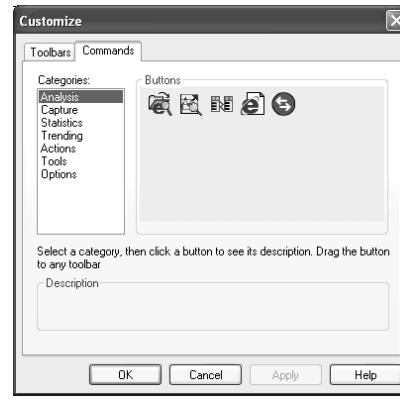
- "Show ToolTips" checkbox—when selected, displays a help balloon on each button when the mouse pointer is placed over the button. This can be toggled off or on.

  It is recommended that this option be left on.

- "New Look" checkbox—allows you to select the look of the buttons from a flat look or a 3D look.
- New button—allows you to create a new, empty toolbar.

- Reset button—allows you to reset the currently-selected button to its original values.

Toolbar Setup – Commands Tab



- Categories—allow you to select the category for which buttons are available: Analysis, Capture, Statistics, Trending, Actions, Tools, Options.
- Buttons—displays the buttons available in each category.

Any button can be added to any toolbar, regardless of the category.

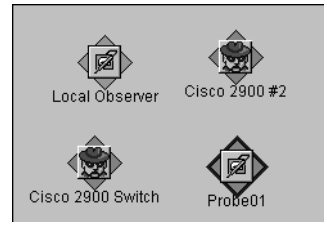
Running Probes with Multiple Interface Cards

With MultiProbe licensing (available as a software Probe option or as a standard part of Expert Observer or Observer Suite), you may run more than one instance of the Probe software on a single machine, associating each instance with a separate network interface card. This allows you to view two or more separate local interfaces concurrently (for example, a local Ethernet and Wireless interface, or two local Ethernet interfaces). See “Managing MultiProbe Instances” in your Probe manual for details.

Displaying the List of Probes in Map Mode

Map mode allows you to view your list of probes on top of a map that may reflect your geographical network layout or your topological network layout. Map mode provides an alternate way to view the list of probes in a freeform layout.

Activate Map mode by selecting **View > Show Probe List as a Map.**



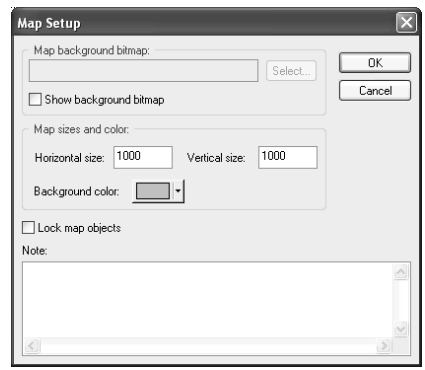
Once a Probe is displayed on the map, you will need to place the Probe in the desired location on the map. Click and drag a Probe icon to move it on the map.

Customizing the Probe Map

When the list of Probes is in map format, you can display your network graphically, either geographically or topologically, with respect to the positions of the Probes. The size of the network map can be bigger than the window, in which case you may move around the map using the horizontal and vertical scroll bars.

You can use one of the maps provided or import your own map in BMP or DIB format. If you choose to use your own map, copy the bitmap into the C:\Observer Files\MAPS directory. Observer supports two-color, 16-color, 256-color, or 24-bit full-color bitmaps (if supported by your monitor/adapter). Observer includes a number of geographical maps.

To select a map, right-click anywhere on the Map and select the “Modify Map Display Properties” menu item. This will display the Map Setup dialog.

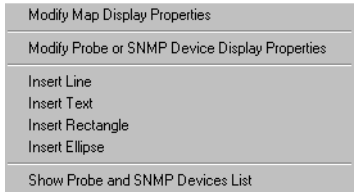


- “Map background bitmap” textbox—the current map name.
- Select button—allows you to select the bitmap to use for the Probe; only active if “Show background bitmap” checkbox is selected.
- “Show background bitmap” checkbox—allows you to select to view the bitmap as a background image.

Map sizes and color:

- “Horizontal size” textbox—allows you to select the horizontal size of the map.
- “Vertical size” textbox—allows you to select the vertical size of the map.
- “Background color” dropdown—allows you to enter the map background color.
- “Lock map objects” checkbox—allows you to lock in place all map objects so they cannot be (mistakenly) moved.
- Note—allows you to enter any notes you may want to keep about the map.

Map Probe List Right-Click Menu



- Modify Map Display Properties—displays the Map Setup dialog.
- Modify Probe or SNMP Device Display Properties—allows you to modify the Map Probe settings; only active if you have selected a map probe item. See “Modifying a Probe Map Item” on page 31.
- Insert Line—displays the Line Description dialog.

“Line Thickness” dropdown—allows you to select the line thickness.

“Line Color” dropdown—allows you to select the line color.

- Insert Text—displays the Describe Text dialog.

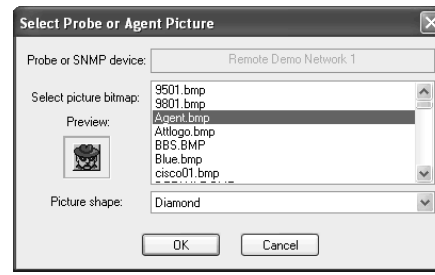
“Text” textbox—allows you to enter the “Describe” text.

- Insert Rectangle—displays the Shape Description dialog.

- Insert Ellipse—displays the Shape Description dialog.
- Show Probe and SNMP Devices List—allows you to view the Probe and SNMP Devices list.

Modifying a Probe Map Item

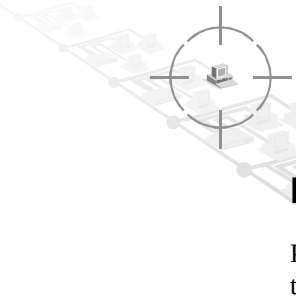
When new Probes are displayed in map mode, they appear in the upper left corner of the map. You can change how Probes are displayed by right-clicking on the Probe map item and selecting “Modify Probe or SNMP Device Display Properties.”



- “Probe or SNMP Device” textbox—displays the name of the Probe map item; not editable.
- “Select picture bitmap” dropdown—allows you to select a picture bitmap.
- “Picture shape” dropdown—allows you to select the shape of the Probe’s background.

Uninstalling Observer

Observer includes a complete uninstalling facility. To remove Observer from your system, simply run the uninstall program by double-clicking on the Uninstall icon.



The Capture Menu

Packet Capture Mode

Packet Capture mode captures network traffic and stores the data for later viewing in the Packet View Decode window. Packet capture is also used to view specific packets during a network conversation. From looking directly at the information being sent and the specific reply, you can often get a clear view of a problem or of an incorrect communication.

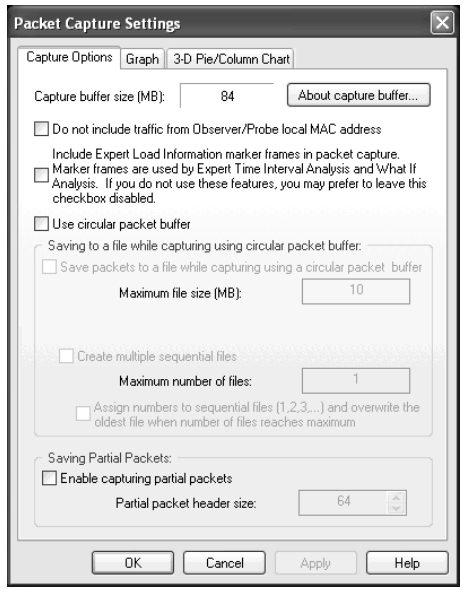
Once the packets are captured, they can be viewed and analyzed in the Decode and Analysis submode of Packet Capture mode. This is true for “live captures” (captures that happen in real time) where Observer captures and saves traffic on the local segment or uses a Probe to capture and save traffic on a remote segment, and for analysis of saved.BFR buffer files, in which the local copy of Observer can be used to examine and analyze packets captured by any copy of Observer.

Packet Capture is available in graph, dial, list, 3D, and pie views.

Packet Capture Setup Options

The Packet Capture Setup dialog is where buffer and packet specific options are set. You can access the **Packet Capture Setup** dialog by selecting **Capture > Packet**

Capture and then clicking on the **Settings** button. The **Capture Setup** dialog will be displayed.


Packet Capture Settings
Capture Options
Graph
3-D Pie/Column Chart
Capture buffer size (MB):
84
About capture buffer...
Do not include traffic from Observer/Probe local MAC address
Include Expert Load Information marker frames in packet capture. Marker frames are used by Expert Time Interval Analysis and What If Analysis. If you do not use these features, you may prefer to leave this checkbox disabled.
Use circular packet buffer
Saving to a file while capturing using circular packet buffer:
Save packets to a file while capturing using a circular packet buffer
Maximum file size (MB):
10
Create multiple sequential files
Maximum number of files:
1
Assign numbers to sequential files (1,2,3,...) and overwrite the oldest file when number of files reaches maximum
Saving Partial Packets:
Enable capturing partial packets
Partial packet header size:
64
OK
Cancel
Apply
Help

- "Capture Buffer size (Kilobytes)" textbox—allows you to set the amount of Windows memory that Observer will set aside to store captured packets. Values are in kilobytes. For example, a 2048 KB buffer would represent a 2.048 MB buffer.

  Observer will show the buffer percentage full and give you an idea of what the best buffer size is for a particular situation. Keep in mind that a full 4 MB buffer is a lot of data to sort through. You will want to capture an event in as little time with as little buffer space as possible.

  Observer has no limitations on the amount of RAM that can be used for a buffer. The maximum allowable buffer size is displayed in Options > Selected Probe or SNMP Device Properties and then clicking on the Probe Parameters tab. The following formulas are used to calculate the maximum allowable buffer:

For Windows 2000/XP

Maximum Buffer Size = (Total Physical Memory-18MB) *.4

> It is not recommended that you use Observer to view packets going to or coming from the Observer PC. If you need to look at the traffic to/from the Observer PC, install Observer on another PC. There are many reasons why this is not a good idea but, in general, you will see varying amounts of your own data with a protocol analyzer on your own PC. This is due to the architecture of the PC and the inability of

Windows to multi-task the receiving and analysis of the data going and coming from the Observer PC.

- Do not include traffic from Observer/Probe local MAC address—excludes packets sent and received from the station running Observer or Probe (the MAC address of the station from which you are capturing packets).
- "Include Expert Load information marker frames" checkbox—When checked, Observer will not strip out the timestamp informational markers used by Expert Time Interval and What If analysis modes. Leave this box unchecked unless you intend to use these modes.
- "Use circular packet buffer" checkbox—allows you to choose the buffer as fixed or circular (first in, first out).
    - **Fixed buffers—**capture packets until the size of all of the captured packets is equal to the size of the buffer defined. At that time, Observer stops capturing packets and can no longer accept any new packets until the buffer is cleared.
    - **Circular buffers**—when the packet capture buffer fills, Observer will write new packets to the end of the buffer and discard packets from the start of the buffer. Using this feature allows you to continually run a packet capture, and once the event of interest takes place, you can immediately go to the Observer station and have the event recorded. You can record the event regardless of how long and how much network activity preceded the event. The circular buffer also allows you to save the buffer to sequentially labeled multiple files (see below).

Saving the buffer to a file or files while capturing using a circular buffer:

- "Save packets to a file while capturing using a circular packet buffer" checkbox—When checked, causes Observer to use a "FIFO" (first in, first out) buffer for packet capture.
- "Maximum file size (MB)" checkbox—Specify the largest file you want written out to your hard disk. The valid range is from 1MB to 2000MB.

Saving partial packets:

- "Enable capturing partial packets" checkbox—by default, Observer will capture the entire packet. This option allows you to define a specific amount of each packet to capture to the buffer. For example, a setting of 64 bytes will result in Observer only capturing the first 64 bytes of every packet.

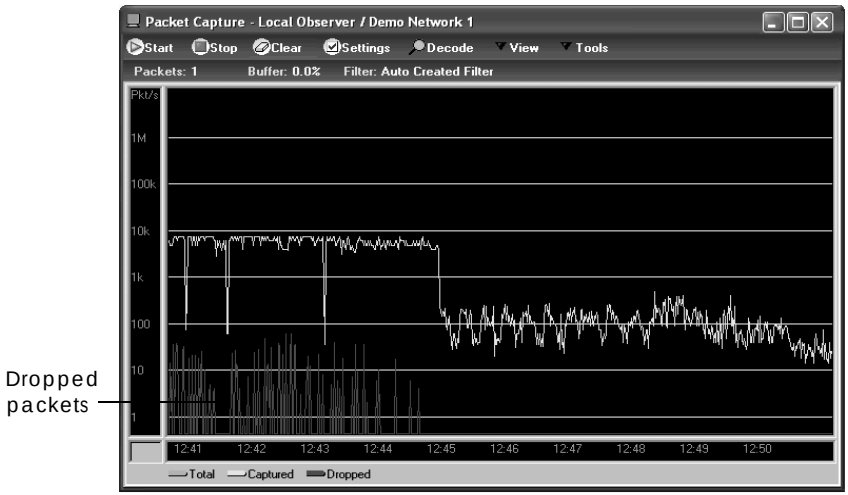
  Most of the pertinent information about the packet (as opposed to the information contained in the packet) is at the beginning of the packet, so this option allows you to collect more packets for a specific buffer size by only collecting the first part of the packet.

Additionally, since it is more efficient collecting only partial packets, if you are having trouble keeping up with your bandwidth, setting this to a lower number will help keep CPU utilization (per captured packet) at a minimum.

- "Partial packet header size" spinbox—indicates the actual number of bytes per packet Observer will capture. Minimum = 16; maximum =10,000.

Packet Capture-Graph View

Select Capture > Packet Capture to display the Packet Capture window.



1. To begin capturing packets, click Start.
2. You will see three different lines on the capture graph.

   The color of each line is set in the **Display Properties** dialog. See "Packet Capture – Graph View Display Properties" on page 37. By default, the blue line shows the non-captured traffic. The yellow line shows the captured traffic. The red line shows dropped packets (if any).

   > Dropped packets represent an error condition that is not part of the normal operation of Observer. If you are seeing dropped packets you should begin to check your hardware for conflicts, or make sure your processing power is up to the minimum requirements of Observer.

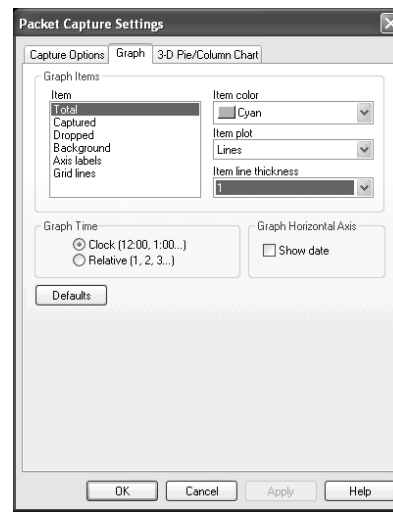
3. Observer will display the percent of your capture buffer that is full, the number of packets captured, and the current filter (if any). Once you have captured some quantity of packets (at least one), you can view the packets with the VIEW button. You can only save the packet buffer from the viewer. See "Packet Capture-Decode and Analysis Submode" on page 37.
4. To stop capturing packets, click the **Stop** button.

5. To clear the capture buffer and stop the capture, click the CLEAR button.
6. To view captured packets, click the **Decode** button.

> In most cases, Packet Capture is more useful if you apply appropriate filters (**Tools->Filter Setup for Selected Probe**). See “Filter Setup for Selected Probe” on page 219.

Packet Capture – Graph View Display Properties

Click Settings and the tab for the type of graph or chart for which you want to set the display properties:



- “Item” dropdown—allows you to select which item will be configured.
- “Item color” dropdown—allows you to select the color of the display item.
- “Item plot” dropdown—allows you to select the item to be displayed as Lines or Bars. This dropdown will only be active if “Lines” is selected in the “Item plot” dropdown.
- “Item line thickness “dropdown—allows you to select the thickness of the displayed item (in pixels).
- Graph Time option buttons—allows you to set how the “X” axis will be displayed. Clock time will show times using a 24-hour clock (i.e., the current time). Relative time will display times from the start of the activation of the mode.

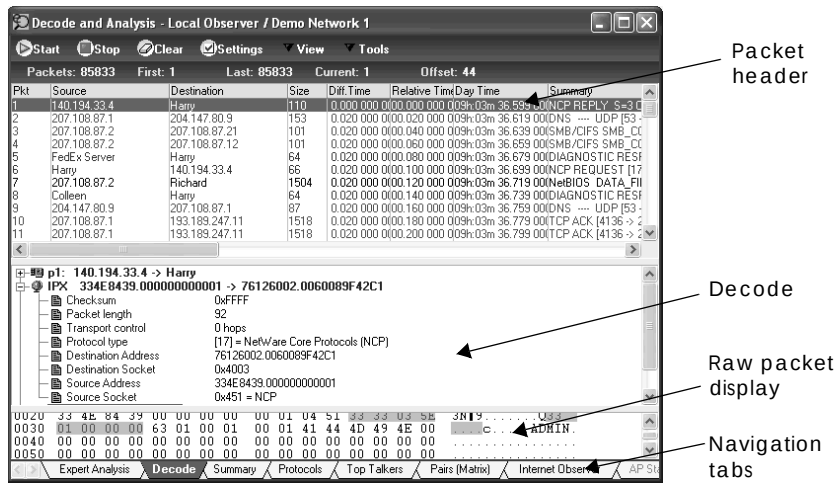
Packet Capture-Decode and Analysis Submode

The Decode and Analysis submode of Packet Capture mode is where the captured buffer is decoded and the packet conversations can be examined and analyzed in detail. Additionally, the Decode and Analysis submode of Packet Capture mode is where two

other independent modes, Ethernet Vital Signs and Collision Expert are accessed, enabling the user to view an Ethernet network's vital signs and more specifically test for collisions that may be caused by a malfunctioning NIC card somewhere on the network.

Decode and Analysis – Decode View

1. To view the packets in the capture buffer, click on the VIEW icon from the Packet Capture button bar or select Capture > Packet Capture, click on the Decode button, and then click on the Decode tab.



Once you are in the view screen, you can click on a particular packet (with your left mouse button) in the top window to display the packet decoded information in the middle window. There are three window panes:

- the packet header pane.
- the decode pane.
- the raw packet display pane.

The three panes are fully sizable by dragging the borders up or down. Packets that Observer does not recognize are shown in raw mode in the decode and raw panes.

The packet header pane shows the following:

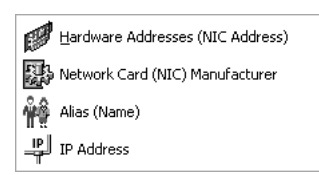
- Packets—the number of packets currently in the buffer.
- First—the first packet number in the buffer.
- Last—the last packet number in the buffer.
- Offset—the "offset" display is only shown if you have highlighted a section of the decode screen. When a section of the decode screen is highlighted,

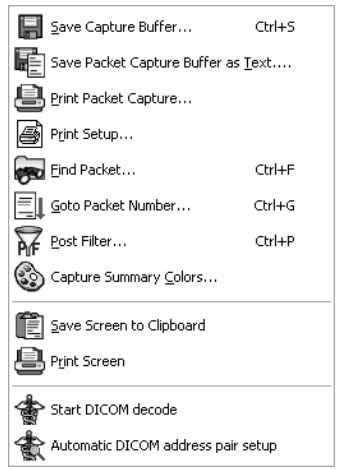
Observer's active highlight option is activated. This option shows the highlighted sections of actual data in the raw area of the packet decode screen as well as the offset of the value from the beginning of the packet. This information can be used to configure an offset filter for that value.

> You can highlight an item of the decode in the Raw Packet Display area and right-click on it. Two options will be displayed: Start Packet Capture on Segment/Offset or Create Filter on Segment/Offset. These options are only available in this area.

Decode and Analysis Packet View Button Bar Descriptions

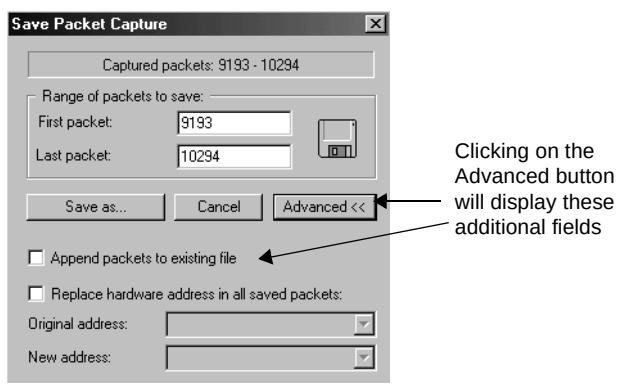
The Packet View Button Bar controls all of the functioning of the decode mode.

	Start mode
	Stops the mode without clearing the buffer.
	Stops the mode and clears the buffer.
	Access the display and graph settings dialogs.
	Access the view menu, which lets you select how stations are identified in the display. You can display stations by:. 

Tools	Access a dropdown menu from which you can:  .

Saving Capture Buffers and Decodes

- Save Capture Buffer—displays the Save Packet Capture dialog.



The **Save Packet Capture** dialog contains the following items:

- Display of captured packets.
- "First packet" textbox—allows you to set the first packet in the capture buffer to be saved to the file. By default, this is packet 1.
- "Last packet" textbox—allows you to set the last packet in the capture buffer to be saved to the file. By default, this is the last packet in the capture buffer.

ADVANCED button—configures the advanced saving features.

- "Append packets to existing file" checkbox—when selected, allows you to add packets to the existing file.
- "Replace hardware address in all saved packets" checkbox—when selected, enables hardware address substitution in the saved buffer.
- "Original address" dropdown—allows you to determine which hardware address will be searched for during the replacement. The hardware address must be entered manually the first time it is used. Observer will remember ten previously-entered addresses. This box is only enabled when the "Replace hardware address in all saved packets" checkbox is selected.
- "New address" dropdown—allows you to determine which hardware address will be replaced during the replacement. The hardware address must be entered manually the first time it is used. Observer will remember ten previously-entered addresses. This box is only enabled when the "Replace hardware address in all saved packets" checkbox is selected.

  As the changes are made in the saved buffer file, and not in the buffer loaded into Observer, in order to change several hardware addresses, it will be necessary to change while saving and then reload the buffer file for each subsequent change.

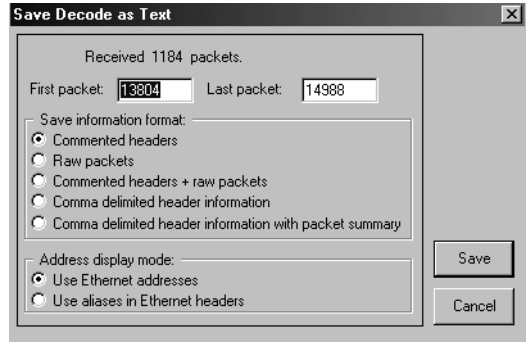
- Save Packet Buffer in Sniffer® Format—displays the Save Packet Capture dialog to save the current Observer packet buffer in Sniffer® format. This is useful for sites that require the sending of Observer capture buffers to Sniffer® users for viewing or analysis. The following extensions will be used (depending on the type of buffer being saved):

  *.enc—for Ethernet captures
  *.trc—for Token Ring captures
  *.fdc—for FDDI captures
  *.cap—for CAP formats

  You can read a Sniffer® formatted buffer by selecting "Load Capture buffer in Sniffer® format" from the main Observer "File" menu item.

- Save Decode as Text—displays the Save Decode as Text dialog and allows you to save the current packet buffer to a text file. This differs from "Save Capture Buffer" in that it will save the buffer in text format (to be viewed by a text editor), where the option under "Save Capture Buffer" saves the packet buffer in Observer's buffer format for the Observer viewer to read at a later date. You will be given a choice of packet numbers to print. The default is set for all captured packets. However, if after reviewing a packet's contents in the "View Packets"

dialog you are interested in some particular section of the capture, you can specify only that section.



- "First packet" textbox—allows you to set the first packet in the capture buffer to be saved to the file. By default, this is packet 1.
- "Last packet" textbox—allows you to set the last packet in the capture buffer to be saved to the file. By default, this is the last packet in the capture buffer.

Save information format (must select one):

- COMMENTED HEADERS option button—if selected, saves the commented headers)
- RAW PACKETS option button—if selected, saves the raw packets.
- COMMENTED HEADERS + RAW PACKETS option button—if selected, saves the commented headers and raw packets.
- COMMA DELIMITED HEADER INFORMATION option button—if selected, saves the comma delimited header information.
- COMMA DELIMITED HEADER INFORMATION WITH PACKET SUMMARY option button—if selected, saves the comma delimited header information with the packet summary.

Address display mode (must select one):

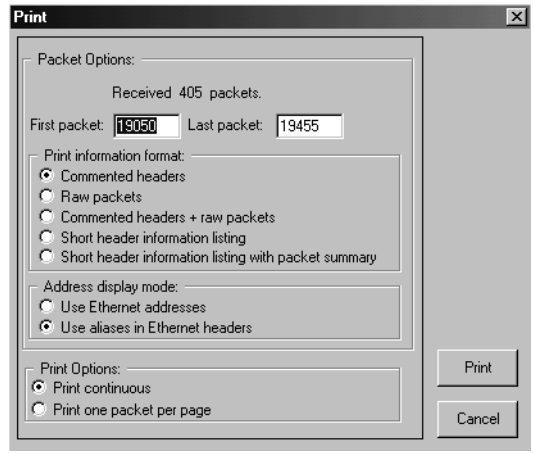
- USE ETHERNET ADDRESSES option button—if selected, displays the Ethernet address.
- USE ALIASES IN ETHERNET HEADERS option button—if selected, displays the aliases in the Ethernet headers.

Printing the Decode

The default print option is set to print all captured packets; however, you can choose from many print options. You can choose to print commented or raw packets or both,

which can be most useful for a programmer analyzing packet details in depth. You can have Observer print Ethernet addresses or aliases as the printed headers.

You can also choose whether Observer will print packets continuously or print each packet on a single page. (Providing that length of a packet allows it, every new packet will always start printing on a new page.)



- Once you have made your print option selections, click on the PRINT button.
- Print Setup—displays the Print Setup dialog.

Adding and Viewing Decode Header Comments

When viewing a saved capture buffer, there is are options to add and view comments. To add a comment to a packet that hasn't yet been commented, right-click on the packet and choose **Add Comment...** from the popup menu. The Packet Comment dialog is displayed:

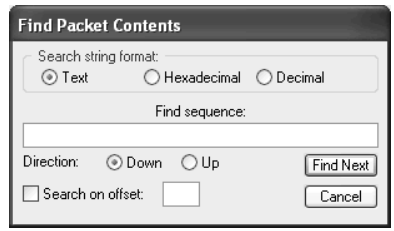
Packet Comment
Dave,
Take a look at the traffic starting here (which has been filtered to capture to and from the web server); Are you seeing anything like this on your local servers?
Edit comment
OK
Cancel

This same dialog is displayed when you select **View Comment...** after right-clicking a packet header that is already commented. The **Edit Comment,** when checked, allows the person viewing the comment to make additions or changes to the comment text.

To delete a comment from a packet header, right click the header and choose **Delete comment...** from the popup menu.

Finding Packets within the Decode

Click the **Tools** button on the Decode window's button bar and select **Find Packet** to display the Find Packet Contents dialog. Here, you can set options to search the capture buffer in whatever format and for whatever string you specify.



Multiple instances of the Find Packet dialog can be active at one time. To activate the multiple instance search, start one search and choose **Tools > Find Packet** again without closing your first search—both will remain active.

Search string format:

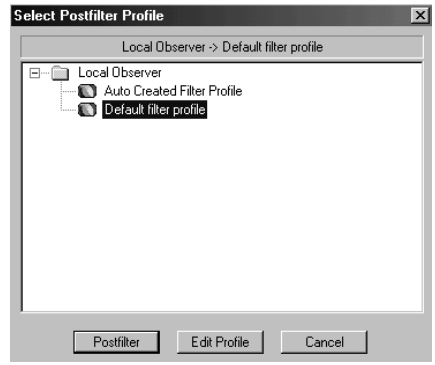
- TEXT option button—if selected, interprets the buffer as text and searches for the given sequence. A maximum of 16 characters are allowed in the string.
- HEXADECIMAL option button—if selected, interprets the buffer as hexadecimal code and searches for the given sequence of codes (separated by spaces; e.g., C0 FF CC). The maximum value for a code is FF.
- DECIMAL option button—if selected, interprets the buffer as decimal code and searches for the given sequence of codes (separated by spaces; e.g., 102 90 87). The maximum value for a code is 255.
- "Find Sequence" textbox—allows you to enter the exact string of characters or codes to search for.

Direction:

- DOWN option button—Search forward through the buffer.
- UP option button—Search backward through the buffer.
- "Search on offset" checkbox and textbox—allows you to define a specific offset to start your search.

PostFilter

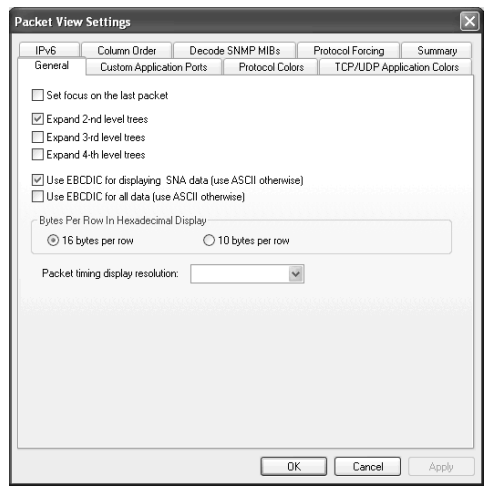
- Choose **PostFilter** from the Decode window's **Tools** menu to re-filter a captured buffer or saved buffer using a different filter profile and displays the Select Postfilter Profile dialog.



  - To select a filter profile, highlight the profile in the tree display.
  - If you click on the EDIT PROFILE button, the Filter dialog will be displayed.

Decode and Analysis – Packet View Settings Setup Properties

Packet View Settings – General Tab

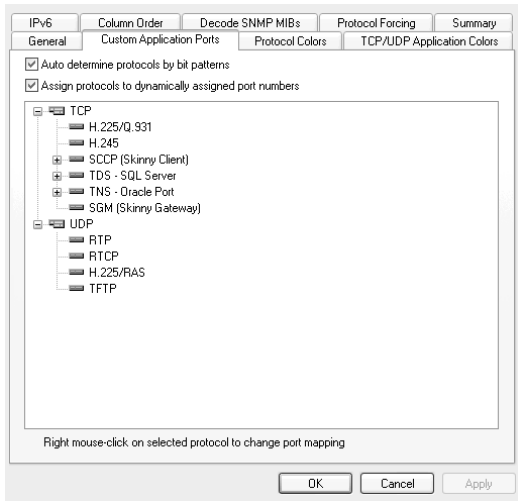


- "Set focus on the last packet" checkbox—causes the tabular packet display to set focus on the last (rather than the first) packet in the capture, allowing you to see the most recently captured information.

  This is particularly useful when viewing a capture live where the user wishes to examine data as it arrives.

- “Expand 2nd level trees” checkbox—when selected, causes the tree decode display to expand all second level trees.
- “Expand 3rd level trees” checkbox—when selected, causes the tree decode display to expand all third level trees.
- “Expand 4th level trees” checkbox—when selected, causes the tree decode display to expand all fourth level trees.
- “Use EBCDIC for displaying SNA data (use ASCII otherwise)” checkbox—in the event that the packet contains SNA (Service Network Architecture) data, selecting this box causes Observer to use EBCDIC (Extended Binary-Coded Decimal Interchange Code) for representing characters as numbers when displaying SNA data. EBCDIC is used almost exclusively on IBM computers.
- “Use EBCDIC for displaying all data (use ASCII otherwise)” checkbox—when selected, Observer uses EBCDIC (Extended Binary-Coded Decimal Interchange Code) for representing characters as numbers when displaying all data. EBCDIC is used almost exclusively on IBM computers.
- “Bytes Per Row in Hexadecimal Display” radio buttons—Choose 16 or 10 bytes per row.
- Packet timing display resolution dropdown—allows you to select the packet timing display resolution.

Packet View Settings – Custom Application Ports Tab

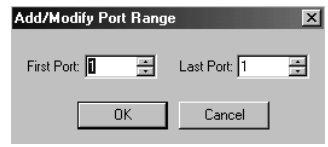


- “Auto determine protocols by bit patterns” checkbox—when selected, Observer will attempt to analyze the RTP and RTCP packets and automatically use the bit patterns to attempt to determine which protocols are contained in the capture buffer.

- “Assign protocols to dynamically assigned port numbers” checkbox—when selected, allows you to manually assign port numbers to dynamic port-based protocols.

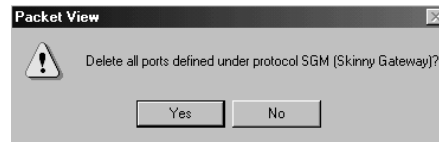
Create an Assignment

1. To create an assignment, right-click on the protocol you wish to assign port numbers to and select the ADD PORTS button. If you already have a port assigned, you may also click on the MODIFY PORTS button. The **Add/Modify Port Range** dialog will be displayed:



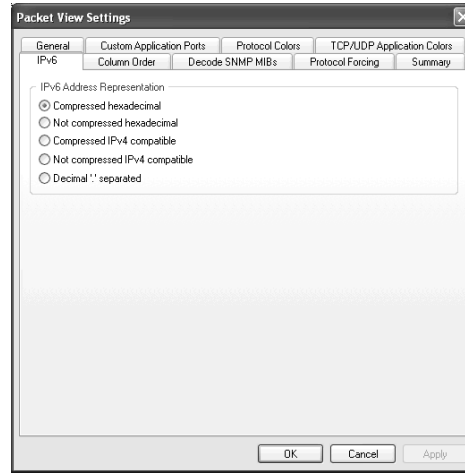
   - “First Port” spinbox—allows you to select the first port.
   - “Last Port” spinbox—allows you to select the last port.

2. To delete an assignment, click on the assignment or protocol to be deleted, right-click, then click on the DELETE ALL PORTS button. A **Delete Confirmation** dialog will be displayed:



3. To execute the deletion, click the YES button. To abort the deletion, click the NO button.

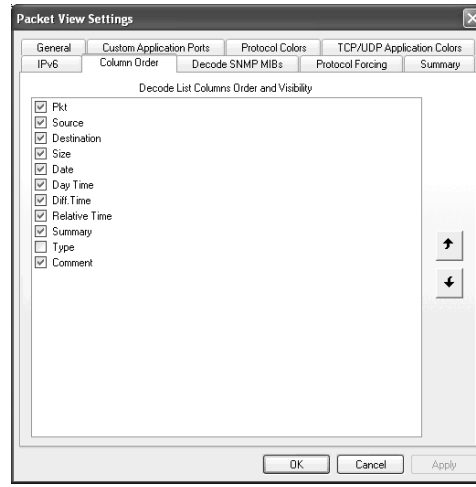
Packet View Settings – IPv6 Tab



You can select from the following option buttons:

- Compressed hexadecimal
- Not compressed hexadecimal
- Compressed IPv4 compatible
- Not compressed IPv4 compatible
- Decimal “.” separated

Packet View Settings – Column Order Tab

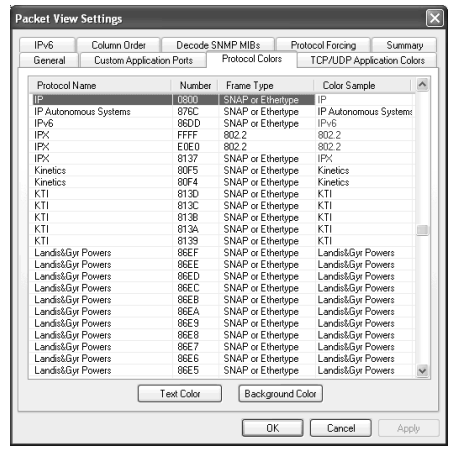


You can select the column order by highlighting an item (the checkbox does not have to be selected) and then clicking on the BEFORE or AFTER button, depending on where you would like the item to fall on your list. The highlighted item will move up or down depending on the button you are clicking. If you do not select an item, it will not be displayed on the list.

Decode List Columns Order and Visibility checkboxes available include the following.

- Pkt
- Source
- Destination
- Type
- Summary
- Diff. Time
- Day Time
- Relative Time
- Size
- BEFORE button
- AFTER button

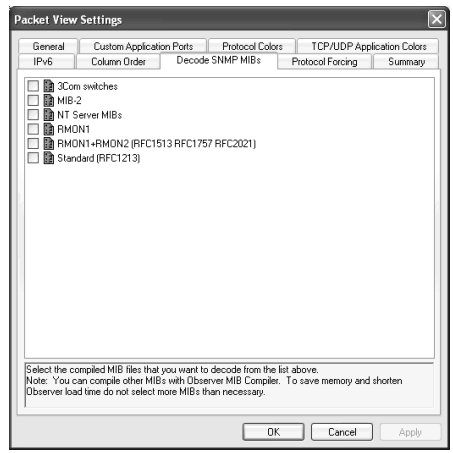
Packet View Settings – Protocol Colors Tab


Packet View Settings
IPv6
Column Order
Decode SNMP MIBs
Protocol Forcing
Summary
General
Custom Application Ports
Protocol Colors
TCP/UDP Application Colors
Protocol Name
Number
Frame Type
Color Sample
IP 0800 SNAP or Ethertype IP
IP Autonomous Systems 876C SNAP or Ethertype IP Autonomous Systems
IPv6 86DD SNAP or Ethertype IPv6
IPX FFFF 802.2 802.2
IPX E0E0 802.2 802.2
IPX 8137 SNAP or Ethertype IPX
Kinetics 80F5 SNAP or Ethertype Kinetics
Kinetics 80F4 SNAP or Ethertype Kinetics
KTI 813D SNAP or Ethertype KTI
KTI 813C SNAP or Ethertype KTI
KTI 813B SNAP or Ethertype KTI
KTI 813A SNAP or Ethertype KTI
KTI 8139 SNAP or Ethertype KTI
Landis&Gyr Powers 86EF SNAP or Ethertype Landis&Gyr Powers
Landis&Gyr Powers 86EE SNAP or Ethertype Landis&Gyr Powers
Landis&Gyr Powers 86ED SNAP or Ethertype Landis&Gyr Powers
Landis&Gyr Powers 86EC SNAP or Ethertype Landis&Gyr Powers
Landis&Gyr Powers 86EB SNAP or Ethertype Landis&Gyr Powers
Landis&Gyr Powers 86EA SNAP or Ethertype Landis&Gyr Powers
Landis&Gyr Powers 86E9 SNAP or Ethertype Landis&Gyr Powers
Landis&Gyr Powers 86E8 SNAP or Ethertype Landis&Gyr Powers
Landis&Gyr Powers 86E7 SNAP or Ethertype Landis&Gyr Powers
Landis&Gyr Powers 86E6 SNAP or Ethertype Landis&Gyr Powers
Landis&Gyr Powers 86E5 SNAP or Ethertype Landis&Gyr Powers
Text Color
Background Color
OK
Cancel
Apply

- Text Color button—displays the Color dialog allowing you to select the text color.
- Background Color button—displays the Color dialog allowing you to select the background color.

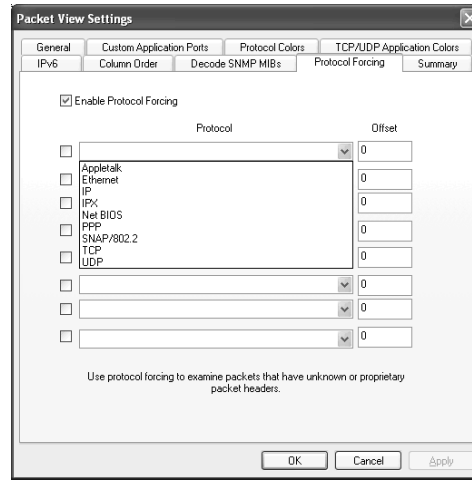
Packet View Settings – Decode SNMP MIBs Tab

Allows you to select the compiled MIB files you would like to decode. It is best to only select the MIBs that are necessary to save memory and shorten the load time. See “The MIB Editor” on page 352.



Packet View Settings – Protocol Forcing

Protocol forcing allows you to examine packets that have unknown or proprietary packet headers.



- "Enable Protocol Forcing" checkbox—selecting this box allows you to enter the desired protocol type and the offset.
- "Protocol" combo box—allows you to select from IP, IPX, NetBIOS, AppleTalk, TCP, or UDP.

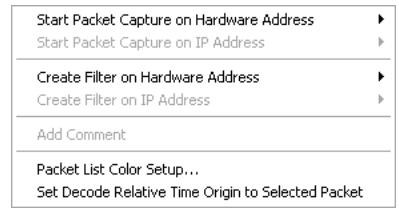
Decode and Analysis – Decode View Display Properties

This menu choice and the corresponding button displays the **Protocol Colors** dialog.

> You can also access this dialog by single-clicking your right mouse button on any packet line in the List Of Packets (the top part of the View Packets screen).

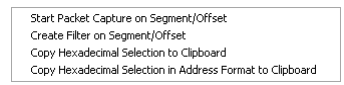
- This allows you to choose the color of the packet line you would like to associate with the selected frame type. For example, you could set all IP packet types to show with a white background and a green foreground, while displaying all IEEE 802.3 packet types (NetWare's default) as a white foreground with a red background. This can help you visually pick out a particular packet type if you are capturing multiple types.

Decode and Analysis – Packet Header and Decode Panes Right-Click Menu


Start Packet Capture on Hardware Address
Start Packet Capture on IP Address
Create Filter on Hardware Address
Create Filter on IP Address
Add Comment
Packet List Color Setup...
Set Decode Relative Time Origin to Selected Packet

- Start Packet Capture on Source Station Address—allows you to start the packet capture on the source station address.
- Start Packet Capture on Destination Station Address—allows you to start the packet capture on the destination station address.
- Start Packet Capture on Station Pair—allows you to start the packet capture on station pair.
- Create Filter on Source Station Address—allows you to create a filter on the source station address.
- Create Filter on Destination Station Address—allows you to create a filter on the destination station address.
- Create Filter on Station Pair—allows you to create a filter on a station pair.
- Packet List Color Setup—displays the Color dialog.
- Set Decode Relative Time Origin to Selected Packet—allows you to set the decode relative time origin to a selected packet.

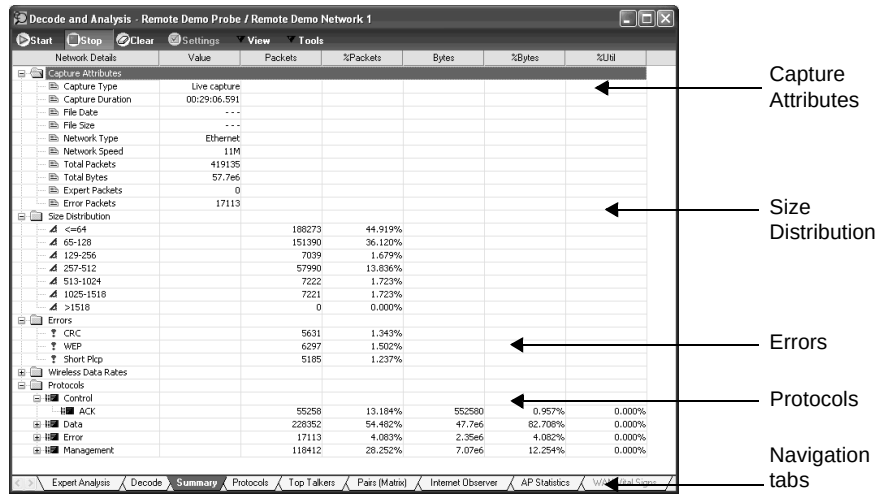
Decode and Analysis – Decode (Raw Packet Pane) Right-Click Menu


Start Packet Capture on Segment/Offset
Create Filter on Segment/Offset
Copy Hexadecimal Selection to Clipboard
Copy Hexadecimal Selection in Address Format to Clipboard

- Start Packet Capture on Segment/Offset—displays the Filters dialog and allows you to start the packet capture on the selected segment.
- Create Filter on Segment/Offset—displays the Filters dialog and allows you to create a filter on the selected segment.
- Copy Hexadecimal Selection to Clipboard—allows you to make a copy of the selected segment and paste it in the desired location.
- Copy Hexadecimal Selection in Address Format to Clipboard—allows you to make a copy of the selected segment in address format and paste it in the desired location.

Decode and Analysis – Summary View

Summary View gives summary information on the packets contained in the capture, whether it is a live capture or a .BFR file being examined. To go to the Summary view, click on the “Summary” navigation tab at the bottom of the Decode and Analysis window.



In Summary View, the Decode and Analysis window contains a browsable tree of Capture Attributes, Size Distribution, and Errors and Protocols. Additional branches may be available depending on the type of network being analyzed (Wireless Data Rates are summarized, for example).

Decode and Analysis – Protocols View

Decode and Analysis Protocols View is similar in appearance and function to Protocol Distribution Statistics mode. The difference between Decode and Analysis Protocols view and Protocol Distribution Statistics mode is that the display is static (reflecting the distribution of protocols in the capture buffer) rather than, as with Protocol Distribution Statistics mode, dynamic (reflecting an ongoing, updated distribution of what is happening on the monitored segment).

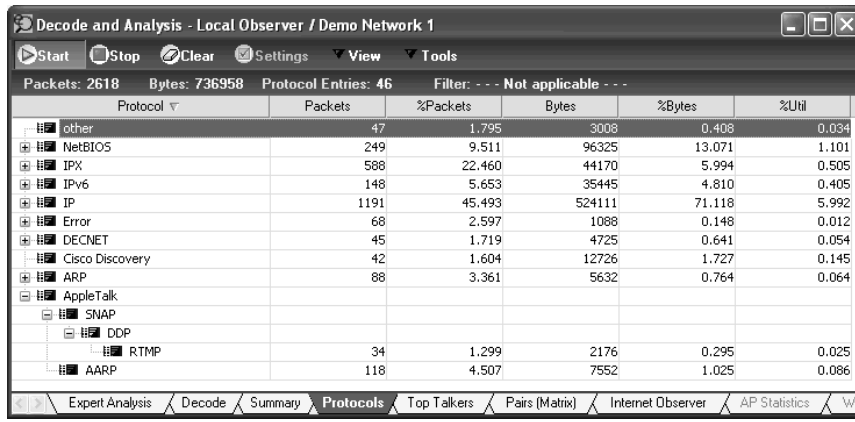
While the numerical display in Protocol Distribution Statistics mode is updated as Observer receives new data, in Protocols View in Decode and Analysis, the display will only change when a new capture is loaded into the buffer, or a new filter is applied to the present capture.

To view Decode and Analysis – Protocols View, click on the “Protocols” navigation tab at the bottom of the Decode and Analysis window.

The selection bar can be used to determine whether All, IP and its subprotocols, or IPX and its protocols will be displayed. If IP or IPX is used, the subprotocol percentage will be calculated based on that protocol, and not on total packets.

Decode and Analysis Protocols – List View

In Decode and Analysis Protocols – List View, the Decode and Analysis window displays a list of the protocols used in the capture.

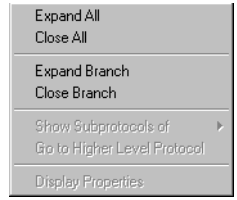


- Protocol—the name of the protocol or subprotocol used.
- Packets—the total number of packets in the protocol captured.
- %Packets—the percentage of the total captures that were sent in the specified protocol.
- Bytes—the total number of bytes in the protocol captured.
- %Bytes—the percentage of the total bytes that were sent in the specified protocol.
- %Util—the percentage bandwidth utilization being sent in the specified protocol.

Decode and Analysis Protocols – List View Display Properties

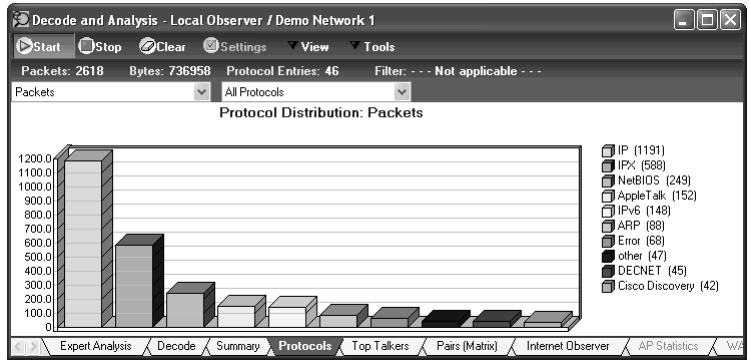
There are no display properties for the List View.

Decode and Analysis Protocols – List View Right-Click Menu

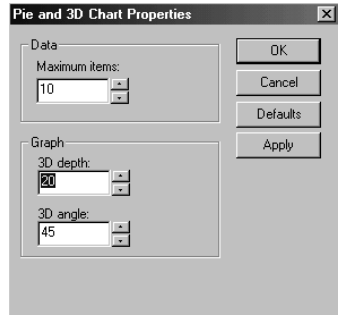


- Expand All—allows you to expand all branches.
- Close All—allows you to close all branches.
- Expand Branch—allows you to open the branch.
- Close Branch—allows you to close the branch.
- Show Subprotocols of—not active.
- Go to Higher Level Protocol—not active.
- Display Properties—not active.

Decode and Analysis Protocols – 3D Column Chart View



Decode and Analysis Protocols – 3D Chart View Display Properties



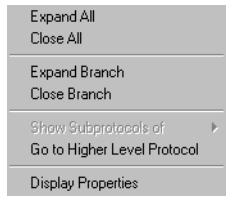
Data:

- “Maximum items” spinbox—allows you to set the maximum items to be displayed.

Graph:

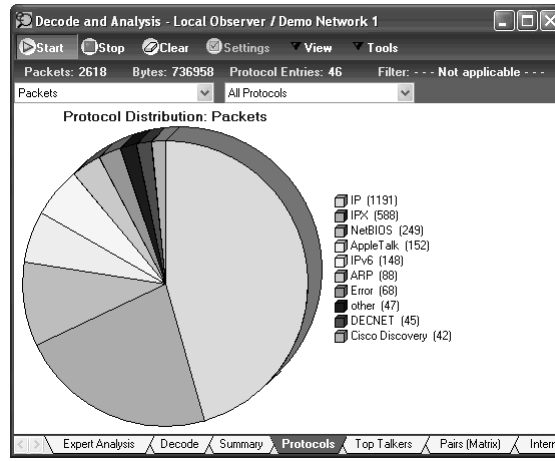
- “3D depth” spinbox—allows you to set the 3D depth of the displayed item.
- “3D angle” spinbox—allows you to set the 3D angle of the displayed item.

Decode and Analysis Protocols – Pie View Right-Click Menu

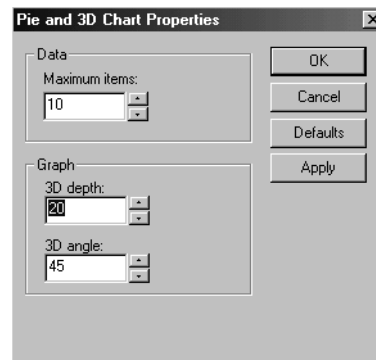


- Expand All—allows you to expand all branches.
- Close All—allows you to close all branches.
- Expand Branch—allows you to open the branch.
- Close Branch—allows you to close the branch.
- Show Subprotocols of—not active.
- Go to Higher Level Protocol—allows you to proceed to the higher level protocol.
- Display Properties—activates the Display Properties dialog.

Decode and Analysis Protocols – Pie View



Decode and Analysis Protocols – Pie View Display Properties



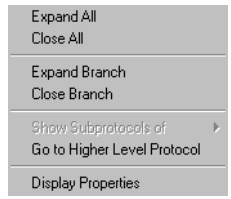
Data:

- “Maximum items” spinbox—allows you to set the maximum items to be displayed.

Graph:

- “3D depth” spinbox—allows you to set the 3D depth of the displayed item.
- “3D angle” spinbox—allows you to set the 3D angle of the displayed item.

Decode and Analysis Protocols – Pie View Right-Click Menu



- Expand All—allows you to expand all branches.
- Close All—allows you to close all branches.
- Expand Branch—allows you to open the branch.
- Close Branch—allows you to close the branch.
- Show Subprotocols of—not active.
- Go to Higher Level Protocol—allows you to proceed to the higher level protocol.
- Display Properties—activates the Display Properties dialog.

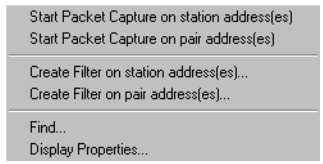
Decode and Analysis – Top Talkers View

Top Talkers View in Decode and Analysis is similar in appearance and function to Top Talkers mode. The difference is that the display is static, reflecting the distribution of packets among the stations in the capture buffer, rather than, as with Top Talkers mode, dynamic: reflecting an ongoing, updated distribution of what is happening on the monitored segment.

While the numerical display in Top Talkers mode changes as Observer receives new data, in Top Talkers View in Decode and Analysis the display will only change when a new capture is loaded into the buffer or a new filter is applied to the present capture.

To view Decode and Analysis – Top Talkers View, click on the “Top Talkers” navigation tab at the bottom of the Decode and Analysis window.

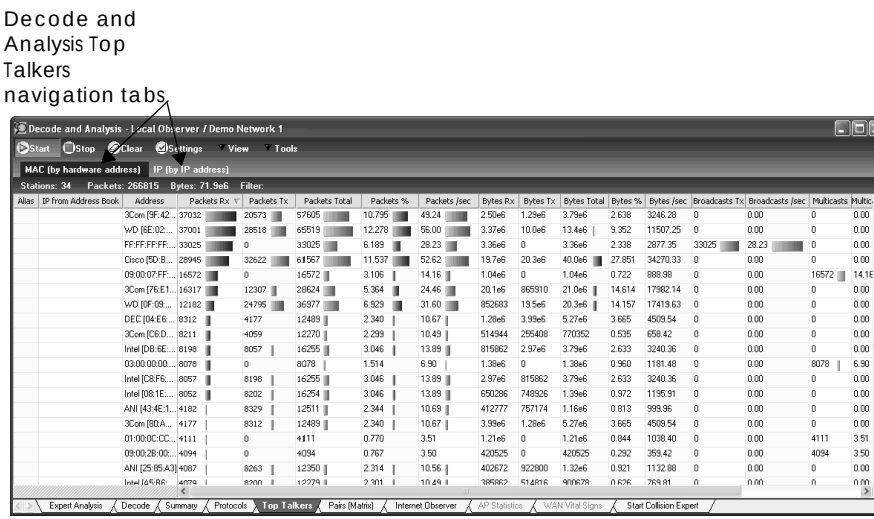
Decode and Analysis Top Talkers – Right-Click Menu


Start Packet Capture on station address(es)
Start Packet Capture on pair address(es)
Create Filter on station address(es)...
Create Filter on pair address(es)...
Find...
Display Properties...

- Start Packet Capture on station address(es)—activates the Filters dialog.
- Start Packet Capture on pair address(es)—activates the Filters dialog.
- Create Filter on station address(es)—activates the Filters dialog.
- Create Filter on pair address(es)—activates the Filters dialog.

- Find—displays the Find dialog.
- Display Properties—displays the Display Properties dialog.

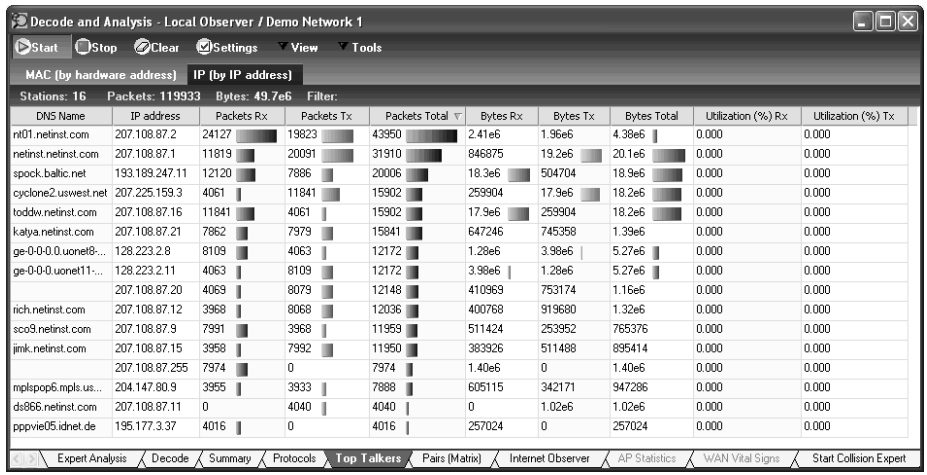
Decode and Analysis Top Talkers View – MAC View



- Alias—displays the alias name of the station.
- IP address—displays the IP address of the station.
- Address—displays the address of the station.
- % Pkts—displays the total number of packets received by the station during the capture.
- Packets—displays the total number of packets received by the station during the present interval.
- Pkt/s—displays the total number of packets received by the station per second.
- % Bytes—displays the total number of bytes received by the station during the capture.
- Bytes—displays the number of bytes received by the station during the present interval.
- Bytes/s—displays the total number of bytes received by the station per second.
- %Brdcst+Multcst/Pkts—displays the total number of broadcast and multicasts per packet.
- Broadcasts—displays the total number of broadcasts.
- Broadcasts/s—displays the total number of broadcasts per second.

- Multicasts—displays the total number of multicasts.
- Multicasts/s—displays the total number of multicasts per second.

Decode and Analysis Top Talkers – IP View



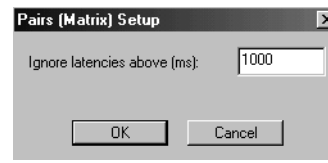
DNS Name	IP address	Packets Rx	Packets Tx	Packets Total	Bytes Rx	Bytes Tx	Bytes Total	Utilization (%) Rx	Utilization (%) Tx
nt01.netinst.com	207.108.87.2	24127	19823	43950	2.41e6	1.96e6	4.38e6	0.000	0.000
netinst.netinst.com	207.108.87.1	11819	20091	31910	846875	19.2e6	20.1e6	0.000	0.000
spock.baltic.net	193.189.247.11	12120	7886	20006	18.3e6	504704	18.9e6	0.000	0.000
cyclone2.uswest.net	207.225.159.3	4061	11841	15902	259904	17.9e6	18.2e6	0.000	0.000
toddw.netinst.com	207.108.87.16	11841	4061	15902	17.9e6	259904	18.2e6	0.000	0.000
katya.netinst.com	207.108.87.21	7862	7979	15841	647246	745358	1.39e6	0.000	0.000
ge-0-0-0.uonet8-...	128.223.2.8	8109	4063	12172	1.28e6	3.98e6	5.27e6	0.000	0.000
ge-0-0-0.uonet11-...	128.223.2.11	4063	8109	12172	3.98e6	1.28e6	5.27e6	0.000	0.000
	207.108.87.20	4069	8079	12148	410969	753174	1.16e6	0.000	0.000
rich.netinst.com	207.108.87.12	3968	8068	12036	400768	919680	1.32e6	0.000	0.000
sco9.netinst.com	207.108.87.9	7991	3968	11959	511424	253952	765376	0.000	0.000
jimk.netinst.com	207.108.87.15	3958	7992	11950	383926	511488	895414	0.000	0.000
	207.108.87.255	7974	0	7974	1.40e6	0	1.40e6	0.000	0.000
mplspop6.mpls.us...	204.147.80.9	3955	3933	7888	605115	342171	947286	0.000	0.000
ds866.netinst.com	207.108.87.11	0	4040	4040	0	1.02e6	1.02e6	0.000	0.000
pppvie05.idnet.de	195.177.3.37	4016	0	4016	257024	0	257024	0.000	0.000

- DNS Name—displays the Domain Name Server name of the station.
- IP address—displays the IP address of the station.
- Packets Rx—displays the total number of packets received by the station during the capture.
- Bytes Rx—displays the total number of bytes received by the station during the capture.
- Packets Tx—displays the total number of packets transmitted by the station during the capture.
- Bytes Tx—displays the total number of bytes transmitted by the station during the capture.
- Total packets—displays the total number of packets received by the station during the capture.
- Total bytes—displays the total number of bytes received by the station during the capture.
- Utilization % Rx—displays the total number of utilities received by the station during the capture.
- Utilization % Tx—displays the total number of utilities transmitted by the station during the capture.

Decode and Analysis Pairs (Matrix)

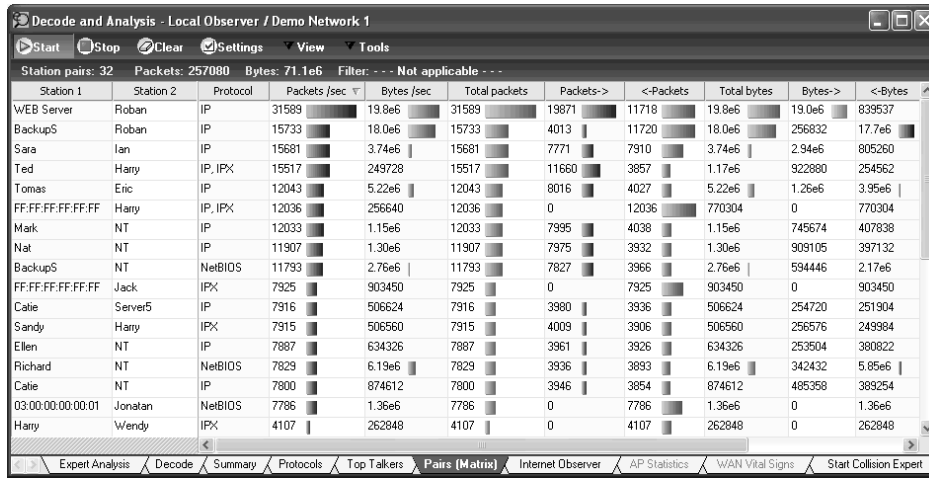
Pairs (Matrix) view in Decode and Analysis is similar in appearance and function to Observer's Pair Statistics (Matrix) mode. The difference is that the display is static, reflecting distribution of conversations in the capture buffer, rather than, as with Pair Statistics (Matrix) mode, dynamic: reflecting an ongoing, updated distribution of what is happening on the monitored segment. While the graphical display in Pair Statistics (Matrix) mode changes as Observer receives new data, in Decode and Analysis – Pairs (Matrix) view, the display will only change when a new capture is loaded into the buffer or a new filter is applied to the present capture.

Decode and Analysis Pairs (Matrix) – Setup Properties

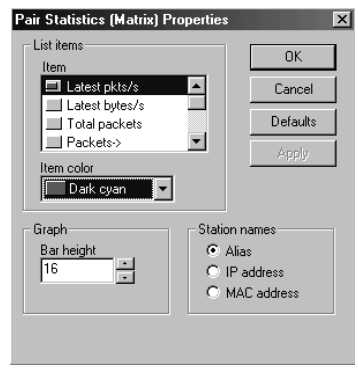


- "Ignore latencies above (ms):" textbox—sets the latency time that (above which), Observer will ignore packets. Latency configuration will make Observer only track packets that are part of a true conversation flow.

Decode and Analysis Pairs (Matrix) – List View



Decode and Analysis Pairs (Matrix) – List View Display Properties



- "Item" dropdown—allows you to select which item will be configured.
- "Item color" dropdown—allows you to select the color of the main display item.

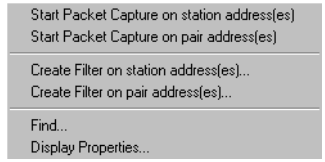
Graph:

- "Bar height" spinbox—allows you to configure the bar height in pixels.

Station names:

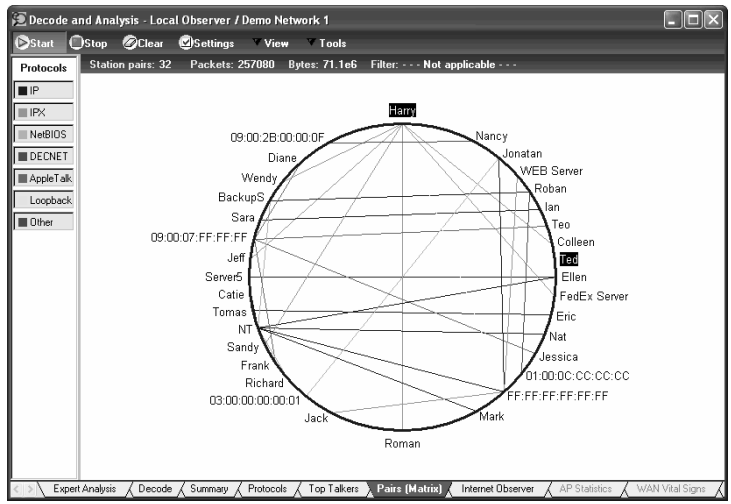
- Alias option button—allows you to select to view stations by alias name.
- IP address option button—allows you to select to view stations by IP address.
- MAC address option button—allows you to select to view stations by MAC address.

Decode and Analysis Pairs (Matrix) – List View Right-Click Menu


Start Packet Capture on station address(es)
Start Packet Capture on pair address(es)
Create Filter on station address(es)...
Create Filter on pair address(es)...
Find...
Display Properties...

- Start Packet Capture on station address(es)—activates the Filters dialog.
- Start Packet Capture on pair address(es)—activates the Filters dialog.
- Create Filter on station address(es)—activates the Filters dialog.
- Create Filter on pair address(es)—activates the Filters dialog.
- Find—displays the Find dialog.
- Display Properties— displays the Display Properties dialog.

Decode and Analysis Pairs (Matrix) – Pair Circle View

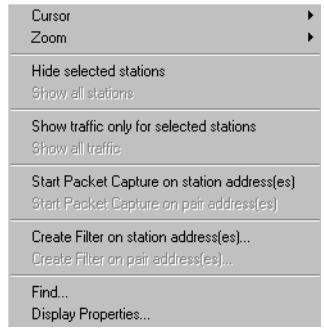


Clicking on the list of Protocols on the selection bar will cause the display of only the selected protocols.

Decode and Analysis Pairs (Matrix) – Dial View Display Properties

There are no display properties for this view.

Decode and Analysis Pairs (Matrix) – Dial View Right-Click Menu



- Cursor—allows you to select the cursor type. You can select from the following: arrow, hand, or magnify.
- Zoom—allows you to select the view mode. You can select from the following: 1x, 2x, 5x, 10x, 20x, or 40x.
- Hide selected stations—hides the highlighted station.
- Show all stations—shows all stations.
- Show traffic only for selected stations—shows all traffic for the highlighted stations.
- Show all traffic—shows all traffic on the network.
- Start Packet Capture on station address(es)—activates the Filters dialog.
- Start Packet Capture on pair address(es)—activates the Filters dialog.
- Create Filter on station address(es)—activates the Filters dialog.
- Create Filter on pair address(es)—activates the Filters dialog.
- Find—displays the Find dialog.
- Display Properties—displays the Display Properties dialog.

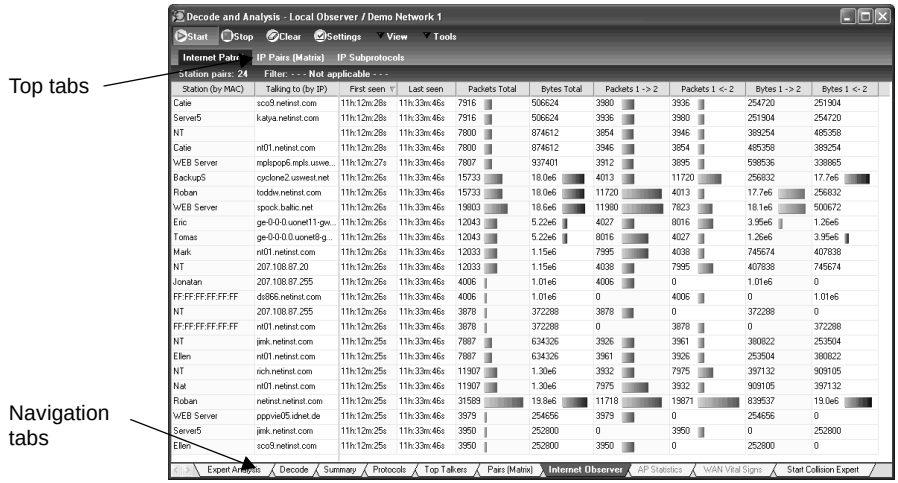
Decode and Analysis – Internet Observer View

Internet Observer View in Decode and Analysis submode of Packet Capture mode is similar in appearance and function to Internet Observer mode. The difference is that the display is static, reflecting the distribution of protocols in the capture buffer, rather than, as with Internet Observer mode, dynamic: reflecting an ongoing, updated distribution of what is happening on the monitored segment. While the numerical display in Internet Observer mode changes as Observer receives new data, in Internet Observer View (in Decode and Analysis submode of Packet Capture mode) the data will only change when a new capture is loaded into the buffer, and when a new filter is applied to the present capture.

To view Decode and Analysis – Internet Observer View, click on the “Internet Observer” navigation tab at the bottom of the Decode and Analysis window.

In Internet Observer View, the top tabs include three options for viewing capture Internet data: Internet Patrol, IP Pairs (Matrix), and IP Subprotocols.

Decode and Analysis Internet Observer – Internet Patrol View



When Internet Patrol is selected, the following items are displayed in the bar above the main table:

- Station pairs—gives the number of station pairs in the capture buffer engaged in IP conversations. A “station pair,” consists of a station sending traffic to another station in one direction. If Station A is sending traffic to Station B and Station B is sending traffic to Station A, that is counted as two station pairs.
- Filter—describes whether or not a filter is present.

The following items are displayed in the main table:

- Station (by MAC)—gives the MAC address of each station.

  In the charts, this is generally referred to as Station 1, or simply as 1.

- Talking to (by IP)—gives the IP address of each station involved in the conversation with the station listed in Station (by IP), above.

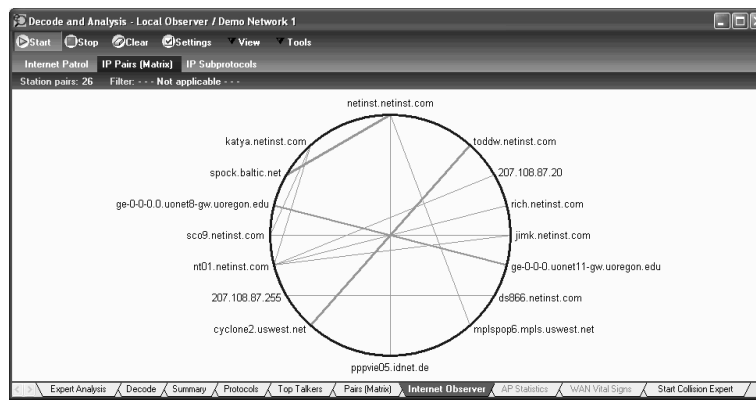
  In the charts, this is generally referred to as Station 2, or simply as 2.

- First seen—displays the time of the earliest packet in the capture sent by the station listed in Talking to (by IP).
- Last seen—displays the time of the most recent packet in the capture sent by the station listed in Talking to (by IP).

- Total packets—displays the total number of packets in the capture sent (in either direction) between the station listed in Station (by IP) and the station listed in Talking to (by IP).
- Total bytes—displays the total number of bytes in the capture sent (in either direction) between the station listed in Station (by IP) and the station listed in Talking to (by IP).
- Packets 1 -> 2—displays the total number of packets sent from the station listed in Station (by IPC) to the station listed in Talking to (by IP).
- Packets 1 <- 2—displays the total number of bytes in the capture sent to the station listed in Station (by IP) from the station listed in Talking to (by IP).
- Bytes 1 -> 2—displays the total number of bytes in the capture sent from the station listed in Station (by IP) to the station listed in Talking to (by IP).
- Bytes 1 <- 2—displays the total number of bytes in the capture sent to the station listed in Station (by IP) from the station listed in Talking to (by IP).

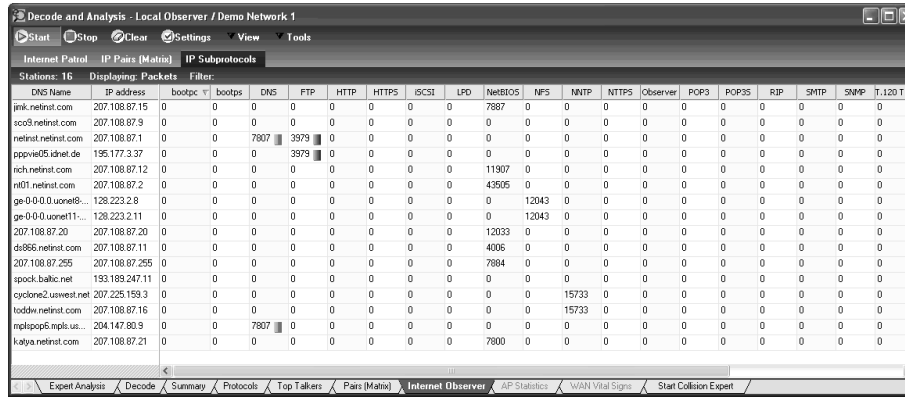
Decode and Analysis Internet Observer – IP Pairs (Matrix) View

When IP Pairs (Matrix) is selected, a circular matrix is displayed, showing IP pair connections.



Clicking on any device on the display brings up a menu that permits configuration of the display and performance.

Decode and Analysis Internet Observer – IP Subprotocols View



When IP Subprotocols is selected from the selection bar, a tabular display appears.

When IP Subprotocols is selected on the selection bar, the following items are displayed in the bar above the main table:

- Stations—gives the number of stations in IP conversations.
- Displaying—describes what units are counted in the display.
- Filter—describes whether or not a filter is present.

The following items are displayed in the main table:

- DNS name—gives the Domain Name Server name of each station that generated data in the present capture.
- IP address—gives the IP address of the station referred to in the previous column.

The remaining columns list all the IP subprotocols that Observer is capable of recognizing. Some of the listed subprotocol columns may contain only zeroes, indicating that no packets of that subprotocol are present in the capture buffer.

The display can be sorted by DNS name, IP address, or by any of the subprotocols.

Click once on the label of any column to sort by descending order; click twice on the label of any column to sort by ascending order.

Reading and Writing Sniffer Files

Observer has the ability to read and write Network General Sniffer® formatted packet capture files. This has been requested for sites that require the sending of Observer capture buffers to Sniffer® users for viewing or analysis. Sniffer® captures can also now be read by Observer to use Observer's decode facility on Sniffer® captures.

Observer fully supports the following:

*.enc—for Ethernet captures
*.trc—for Token Ring captures
*.fdc—for FDDI captures
*.cap—for CAP files

Options for reading or writing Sniffer® formatted packet buffers are available from the Packet View Mode Commands menu.

The Statistics Menu

Bandwidth Utilization

Shows bandwidth usage statistics for your network.

Menu Path

Statistics ->Bandwidth Utilization. The mode starts immediately.

Purpose

Bandwidth Utilization is calculated by recording the number of bytes seen by the Observer (or Probe) station over a 1-second interval. This value is then adjusted by adding to the appropriate MAC header and footer data size information. From this point, the amount of data is compared to the maximum theoretical throughput of your NIC driver reports (i.e., 10MB, 100MB, or whatever your NIC card is reporting) and a percentage statistic is displayed.

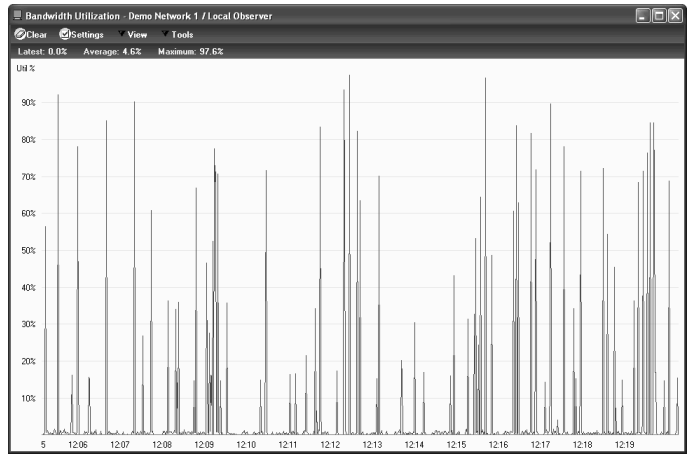
Bandwidth Utilization displays a graph that is an instantaneous “window” on your bandwidth utilization. Information is real-time, although the graph will only display up to 16 minutes of information. Sampling is once per second.

You cannot start or stop this mode. When the mode is displayed, it is automatically started. To stop the mode, simply close the mode window. The Bandwidth Utilization display can be viewed in graph, dial, list, 3D, or pie views. There is no setup dialog for Bandwidth Utilization.

Once you are in the Bandwidth Utilization screen, the graph shows the current bandwidth utilization. Maximum, average, and latest utilization values are shown at the top of the graph.

Available Views

- Graph View
- Dial View
- List View
- 3D Column Chart View

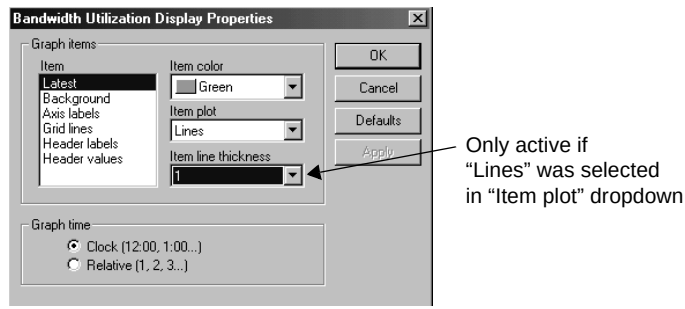


Graph View Display Properties

To set the display properties, either:

- right-click the display,
- click the icon, or
- select Mode Commands->Display Properties

The **Display Properties** dialog offers configuration options for the components of the display.

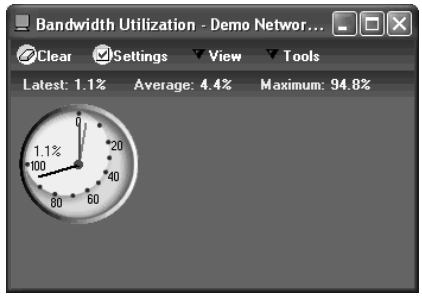


- “Item” dropdown—allows you to select which item will be configured.
- “Item color” dropdown—allows you to select the color of the main (Bandwidth) display item.
- “Item plot” dropdown—allows you to select the item to be displayed as lines or bars.

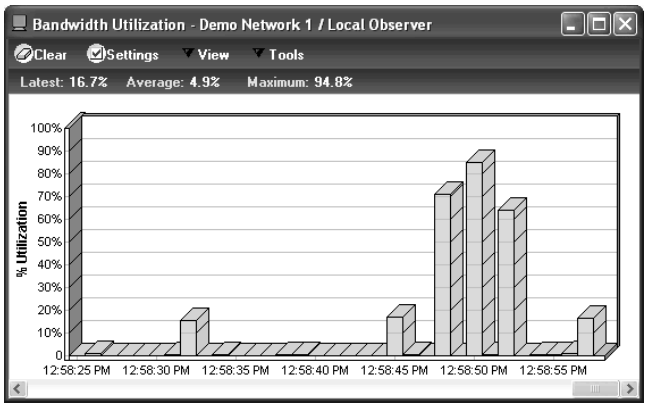
- “Item line thickness” dropdown—allows you to select the thickness of the line (in pixels). This field is only active if “Lines” was selected in “Item plot.”
- “Graph Time” option buttons—allows you to set how the “X” axis will be displayed. Clock time will show times using a 24-hour clock (i.e., the current time). Relative time will display times from the start of the activation of the mode.

> The Bandwidth Utilization display is not subject to any filters as it compares the actual activity on the network to the network’s theoretical capacity.

Dial View

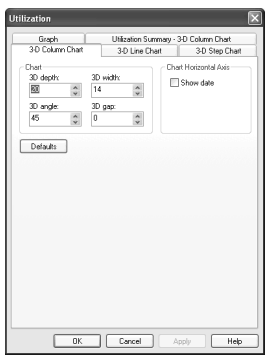


3D Column Chart View



3D Column Chart View Display Properties

To set the display properties for list view, click **Settings**.



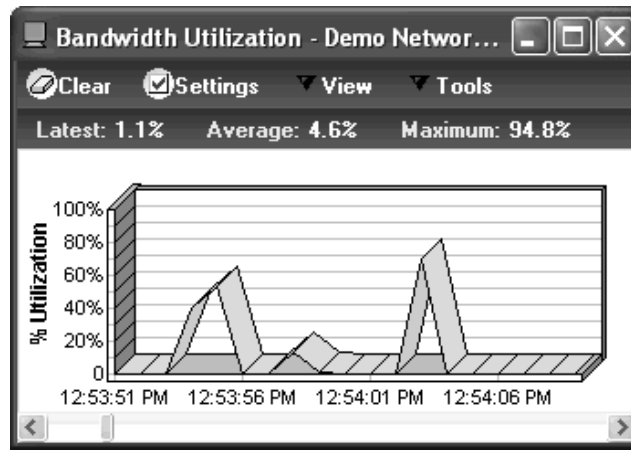
The Data fields are:

- “Maximum items” spinbox—allows you to select the maximum items to be displayed.

The Graph fields are:

- “3D depth” spinbox—allows you to select the 3D depth of the graph items.
- “3D angle” spinbox—allows you to select the 3D depth of the graph items.

3D Line Chart View



Related Topics

- **3D Step Chart View** on page 136.
- **Utilization History Mode** on page 132.

Efficiency History

Provides a benchmark of network efficiency, useful for measuring the impact of administrative changes to your network.

Menu Path

Statistics->Efficiency History. The mode starts immediately.

Purpose

Efficiency History was designed to provide a snapshot of your network’s current efficiency. Running the efficiency test (over time) should provide similar values for similar network loads from a single Observer PC. In other words, this test is dependent on the network card in the Observer PC and the current load of the network. It is designed to give an aggregate view of efficiency. The value should be about the same when run in similar situations.

Unlike most of the diagnostic modes, Efficiency History generates a small amount of network traffic: 420 packets per minute on Ethernet and 180 packets per minute on a Token Ring. Such small loads will have no effect on network performance.

A common use for this mode is to judge the effectiveness, or lack of effectiveness, of changes and alterations to your network setup/configuration. Many administrators use this item as a gauge prior to a network change and then after the change is complete. If the number goes down, you know that the change has affected your network's ability to carry data in a negative way. If the number goes up, the change has improved your network's ability to carry data.

You should run the test often to get a "feel" for what your network should read. Once you know a baseline value for your network, any large change in one direction or another should give you a reason to investigate.

When the mode is active, the test is run every 10 seconds. The test consists of Observer bursting 70 packets (for Ethernet and Fast Ethernet) or 30 (for Token Ring) onto the network. The first 10 packets are ignored, but the rest are measured for the network's ability to let data flow. Results are displayed in megabits/s.

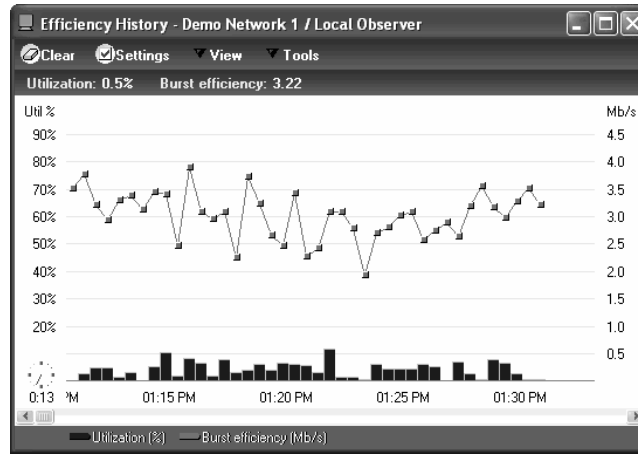
You cannot start or stop this mode. When the mode is displayed, it is automatically started. To stop the mode, simply close the mode window. The Efficiency History display can be viewed in graph, dial, list, 3D, or pie views. There is no setup dialog for Efficiency History.

Efficiency History can be activated from the main window by selecting **Statistics** > **Efficiency History**.

Available Views

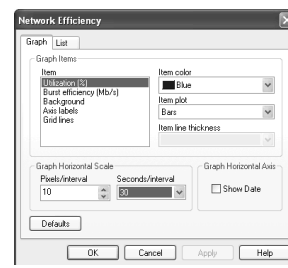
- Graph View
- Dial View
- List View

Graph View



Display Properties

To set display properties, click the **Settings** button. The **Display Properties** dialog offers configuration options for the components of the display.



- "Item" dropdown—allows you to select which item will be configured.
- "Item color" dropdown—allows you to select the color of the main display item.
- "Item plot" dropdown—allows you to select the item to be displayed as lines or bars.
- "Item line thickness" dropdown—allows you to select the thickness of the line; this dropdown is only active if you have selected "Lines" from the "Item plot" dropdown.

Graph horizontal scale:

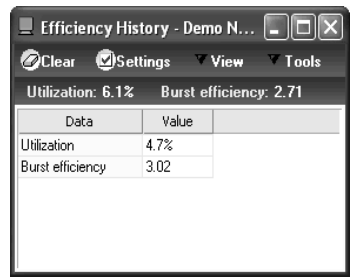
- "Pixels/interval" spinbox—allows you to select how many pixels each interval display will occupy.
- "Seconds/interval" dropdown—allows you to set the number of seconds Observer will average before displaying interval information.

Dial View

Display Properties

There are no display properties available for this view.

List View



Internet Observer Mode (Internet Patrol, Pairs Matrix, IP Subprotocols)

Lets you look at internet usage by users, by connection pairs, or by subprotocols.

Menu Path

To start Internet Observer mode, select **Statistics > Internet Observer (IP Matrix)** or click on the icon. Click to start the mode. The mode has a three tabs:

- Internet Patrol Tab
- IP Pairs (Matrix) Tab
- IP Subprotocols Tab

Purpose

Internet Observer mode permits you to examine Internet traffic on your network. This can be used to monitor overall Internet usage and to focus on a specific station or stations. You can also break down Internet usage by subprotocols. For example, you can easily determine what proportion of Internet traffic involves the WWW vs. popmail.

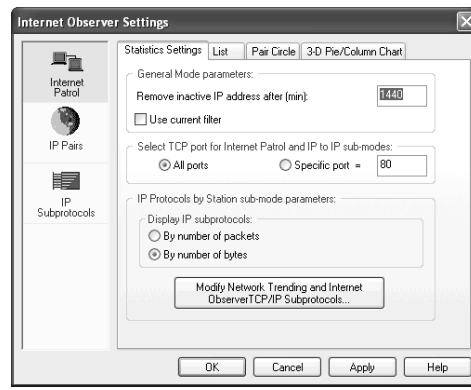
Internet Observer mode is designed to keep track of users' Internet usage in a number of different tabs: Internet Patrol, IP Pairs (Matrix), and IP Subprotocols.

Available Views

- Pair Circle
- List
- 3D Column Chart
- 3D Pie Chart

Internet Observer Setup Properties

The Internet Observer Setup dialog includes setup options for all three Internet Observer tabs.



Statistics settings:

- "Remove inactive IP address after (min)" textbox—allows you to set the number of minutes that inactive IP addresses will remain in the display.
- "Use current filter" checkbox—when checked, the current filter will be used. When unchecked no filtering will be used.
- Select TCP port for Internet Patrol and IP to IP Sub-Modes option buttons—allows you to select only one TCP port to track or all TCP traffic (all ports). If you select the Specific port option button, you are required to enter the port number in the available textbox.

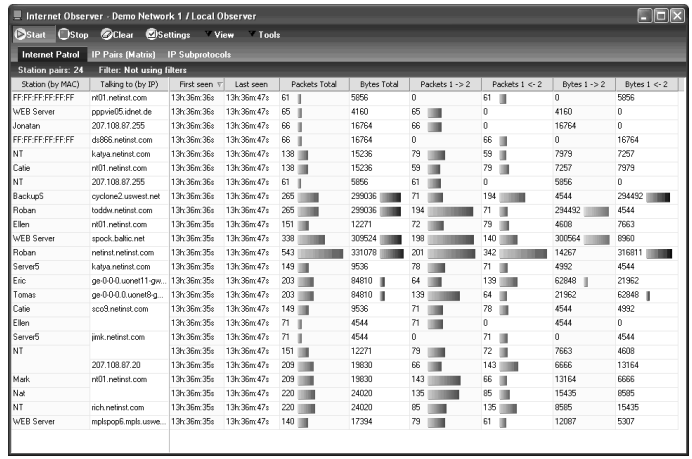
- IP Subprotocols by Station sub-mode parameters option buttons—allows you to configure the display of the port by port data: either by number of packets or by number of bytes.
- Modify Network Trending and Internet Observer TCP/IP Subprotocols button—clicking this button displays the list of protocols to use for the IP Subprotocols submode tab. Twelve (12) subprotocols can be defined.

Internet Patrol Tab

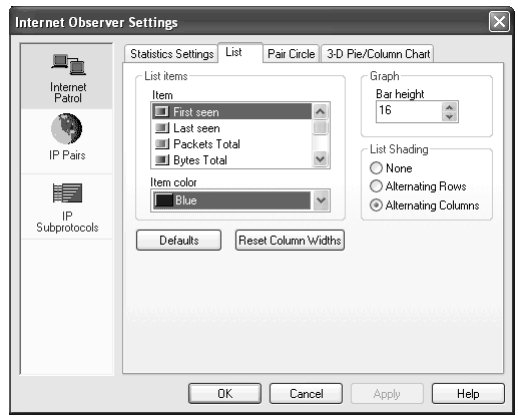
Internet Patrol displays MAC address to layer 3 IP address traffic. If the MAC address has an alias assigned, this text will be displayed instead of the true MAC address. Additionally, the IP addresses of the destination sites will be resolved using DNS.

This view of your Internet traffic is most appropriate for local network traffic to and from the Internet, and for sites that use DHCP. Since DHCP changes IP addresses frequently, source IP addresses are not useful on DHCP site for identification.

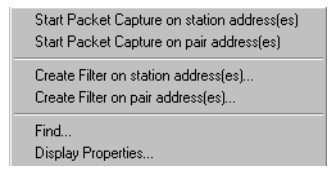
List View



List View Properties



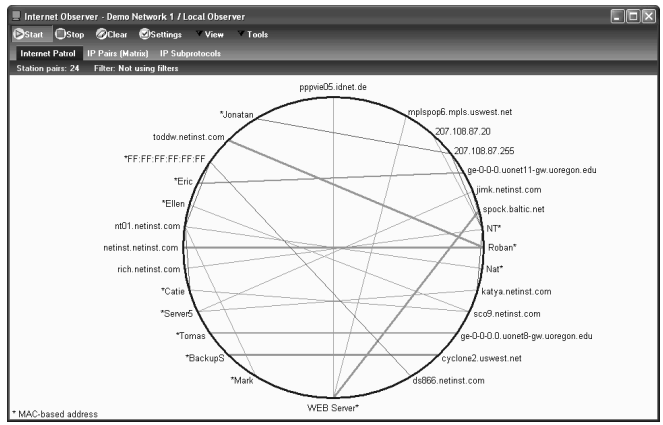
Right-Click Menu


Start Packet Capture on station address(es)
Start Packet Capture on pair address(es)
Create Filter on station address(es)...
Create Filter on pair address(es)...
Find...
Display Properties...

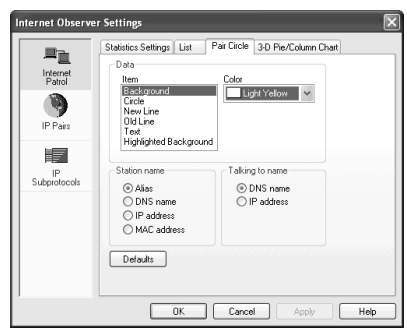
- Start Packet Capture on station address(es)—activates the Filters dialog.
- Start Packet Capture on pair address(es)—activates the Filters dialog.
- Create Filter on station address(es)—activates the Filters dialog.
- Create Filter on pair address(es)—activates the Filters dialog.

- Find—displays the Find dialog.
- Display Properties—displays the Display Properties dialog.

Pair Circle View



Display Properties



Data:

- "Item" list—allows you to select the item to be configured.
- "Color" dropdown—allows you to select the color of the item listed in the "Item" list box.

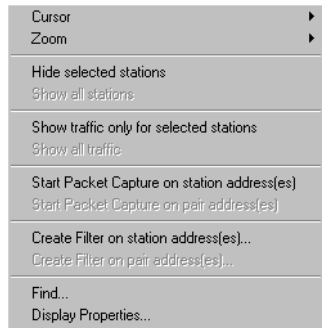
Station name—allows you to select from one of the following:

- Alias option button—allows you to select to view stations by alias name.
- DNS name option button—allows you to select to view stations by DNS name.
- IP address option button—allows you to select to view stations by IP address.
- MAC address option button—allows you to select to view stations by MAC address.

Talking to name:

- DNS name option button—allows you to select to talk to stations by DNS name.
- IP address option button—allows you to select to talk to stations by IP address.

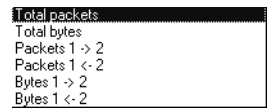
Right-Click Menu



- Cursor—allows you to select the cursor type. You can select from the following: arrow, hand, or magnify.
- Zoom—allows you to select the view mode. You can select from the following: 1x, 2x, 5x, 10x, 20x, or 40x.
- Hide selected stations—hides the highlighted station.
- Show all stations—shows all stations.
- Show traffic only for selected stations—shows all traffic for the highlighted stations.
- Show all traffic—shows all traffic on the network.
- Start Packet Capture on station address(es)—activates the Filters dialog.
- Start Packet Capture on pair address(es)—activates the Filters dialog.
- Create Filter on station address(es)—activates the Filters dialog.
- Create Filter on pair address(es)—activates the Filters dialog.
- Find—displays the Find dialog.
- Display Properties—displays the Display Properties dialog.

3D Column Chart View

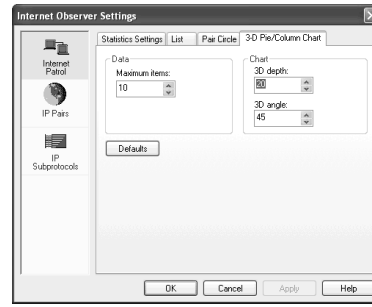
You can determine how the chart collects its data by clicking on the dropdown:



You can select from the following:

- Total packets—displays the total number of packets in the capture sent in either direction.
- Total bytes—displays the total number of bytes in the capture sent in either direction.
- Packets 1 -> 2—displays the total number of packets sent from the station.
- Packets 1 <- 2—displays the total number of bytes in the capture sent to the station.
- Bytes 1 -> 2—displays the total number of bytes in the capture sent from the station.
- Bytes 1 <- 2—displays the total number of bytes in the capture sent to the station.

Display Properties



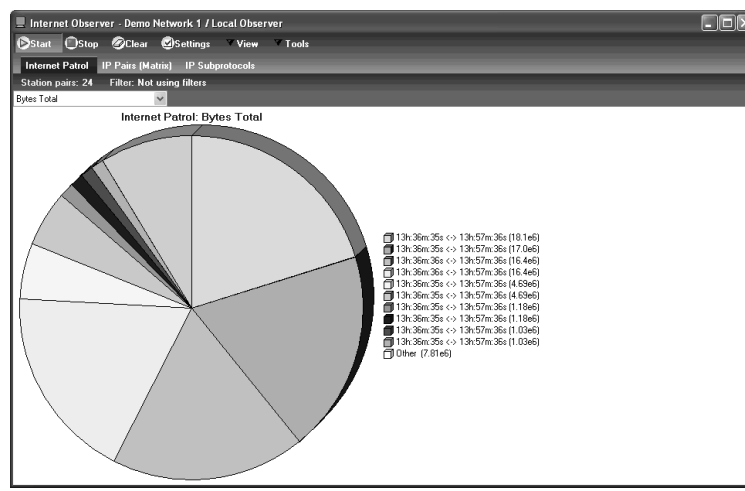
Data:

- "Maximum items" spinbox—allows you to select the maximum items to be displayed.

Graph:

- "3D depth" spinbox—allows you to select the 3D depth of the graph items.
- "3D angle" spinbox—allows you to select the 3D depth of the graph items.

3D Pie Chart View



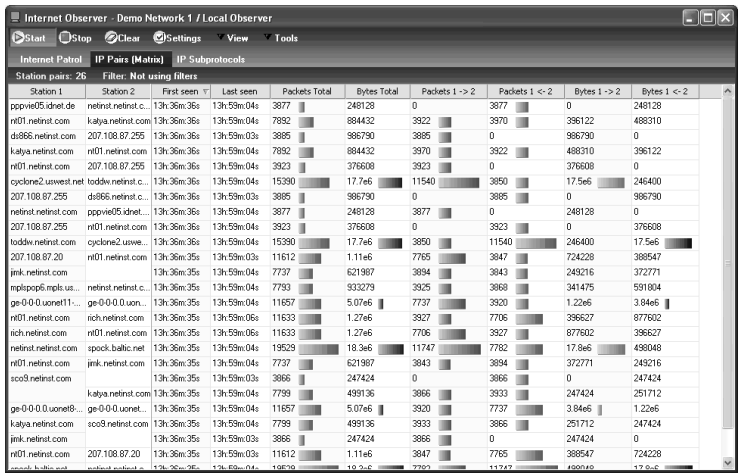
IP Pairs (Matrix) Tab

IP to IP Pairs (Matrix) displays true layer 3 IP address to true layer 3 IP address traffic. This view of your Internet traffic is appropriate for local segments talking to the Internet and for backbone traffic flow.

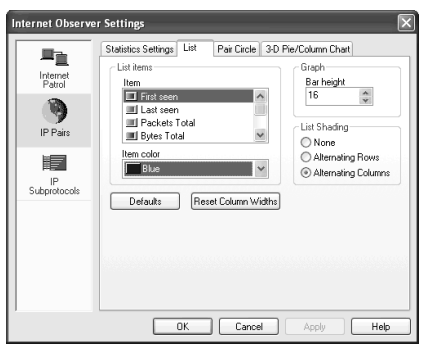
On a local network, this view will show all Internet usage IF the IP addresses are static. If you are using DHCP on your local network, you should view your Internet traffic using the “Internet Patrol” tab described above.

List View

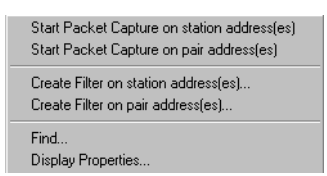
On a backbone, this view can show true user Internet usage and traffic flow, even if your users are downstream from the backbone via routers.



Display Properties



Right-Click Menu

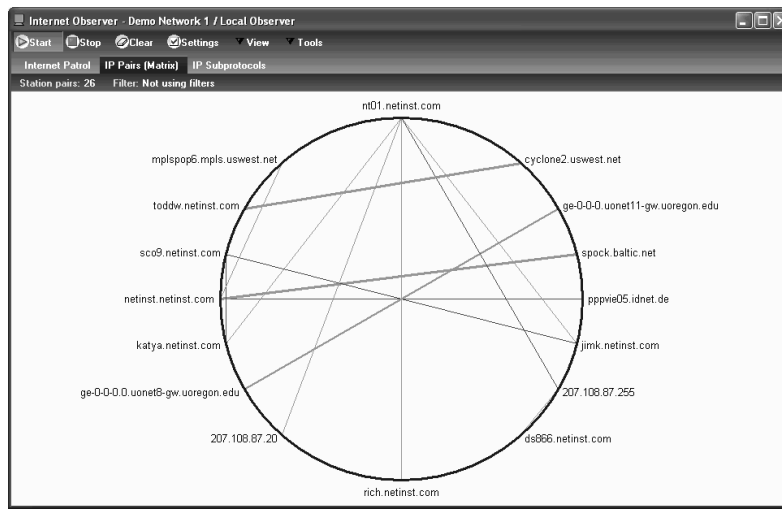

Start Packet Capture on station address(es)
Start Packet Capture on pair address(es)
Create Filter on station address(es)...
Create Filter on pair address(es)...
Find...
Display Properties...

- Start Packet Capture on station address(es)—activates the Filters dialog.

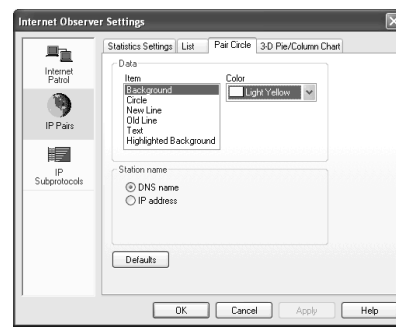
- Start Packet Capture on pair address(es)—activates the Filters dialog.
- Create Filter on station address(es)—activates the Filters dialog.
- Create Filter on pair address(es)—activates the Filters dialog.
- Find—displays the Find dialog.
- Display Properties—displays the Display Properties dialog.

Pair Circle View

This display shows Internet connections in a “spider graph” as Observer senses your users accessing sites. By right clicking on any of the addresses shown in the display, you can start a packet capture.



Display Properties



Data:

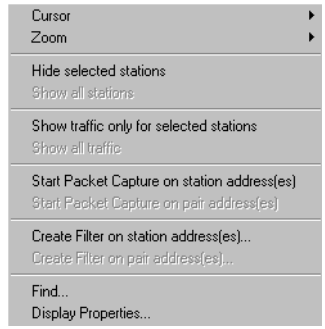
- “Item” list—allows you to select which item will be configured.

- “Color” dropdown—allows you to select the color of the display item.

Station name:

- DNS name option button—allows you to select to view stations by DNS name.
- IP address option button—allows you to select to view stations by IP address.

Right-Click Menu



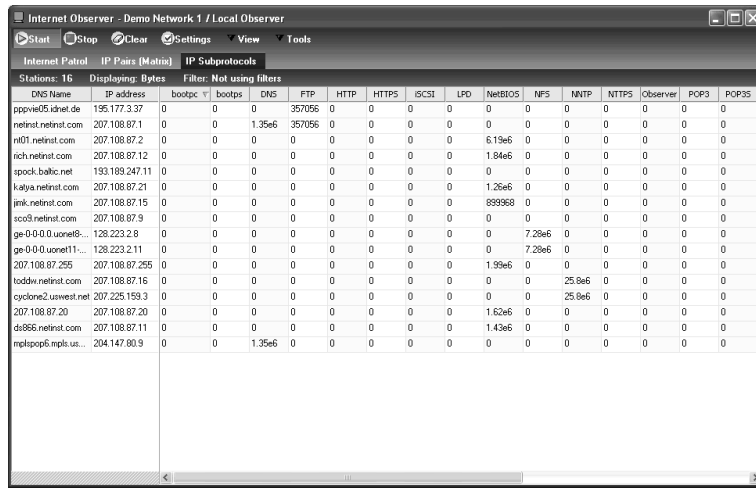
- Cursor—allows you to select the cursor type. You can select from the following: arrow, hand, or magnify.
- Zoom—allows you to select the view mode. You can select from the following: 1x, 2x, 5x, 10x, 20x, or 40x.
- Hide selected stations—hides the highlighted station.
- Show all stations—shows all stations.
- Show traffic only for selected stations—shows all traffic for the highlighted stations.
- Show all traffic—shows all traffic on the network.
- Start Packet Capture on station address(es)—activates the Filters dialog.
- Start Packet Capture on pair address(es)—activates the Filters dialog.
- Create Filter on station address(es)—activates the Filters dialog.
- Create Filter on pair address(es)—activates the Filters dialog.
- Find—displays the Find dialog.
- Display Properties—displays the Display Properties dialog.

IP Subprotocols Tab

IP subprotocols display layer 3 IP addresses traffic flow broken down by subprotocol. Subprotocols are defined in the setup dialog. Twelve (12) user-defined subprotocols

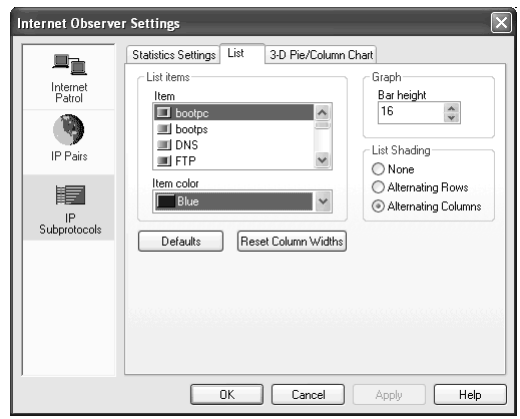
can be created. “Other” indicates a protocol that did not match the criteria of the twelve user-defined protocols.

List View



Display Properties

Display properties can be set by right-clicking on the display or by clicking the icon. The **Display Properties** dialog offers configuration options for the components of the display.

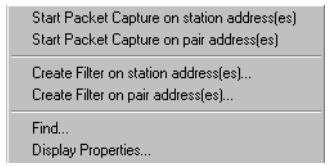


- “Item” dropdown—allows you to select which item will be configured.
- “Item color” dropdown—allows you to select the color of the main display item.

Graph:

- “Bar height” spinbox—allows you to select the bar height.

Right-Click Menu


Start Packet Capture on station address(es)
Start Packet Capture on pair address(es)
Create Filter on station address(es)...
Create Filter on pair address(es)...
Find...
Display Properties...

- Start Packet Capture on station address(es)—activates the Filters dialog.
- Start Packet Capture on pair address(es)—activates the Filters dialog.
- Create Filter on station address(es)—activates the Filters dialog.
- Create Filter on pair address(es)—activates the Filters dialog.
- Find—displays the Find dialog.
- Display Properties—displays the Display Properties dialog.

Network Activity Display

Shows critical network utilization and broadcast information graphed against a traffic reference line.

Menu Path

Click **Statistics->Network Activity Display.** The mode starts running immediately.

Purpose

The Network Activity Display can show you the health of a network at a glance and can warn of impending slowdowns due to broadcast or multicast storms.

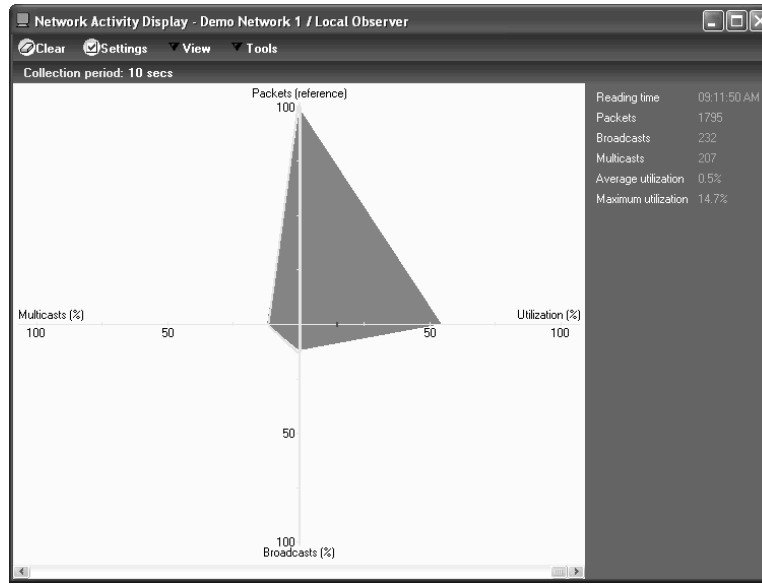
Available Views

- Network Activity Plot
- Graph View
- List View

Network Activity Plot

The Network Activity Plot view shows critical network utilization and broadcast information graphed against a packet traffic reference line. This display can show you

at a glance the health of a network and can warn of impending slowdowns due to broadcast or multicast storms.



The indicator lines change color for easy viewing of specific network conditions:

- If an indicator line is yellow, the NAD is showing a network condition that is essentially idle (total net utilization is under 5%).

  In this case, the percentage of broadcast or multicast packets may be high compared to actual traffic. However, because the traffic is so low, this condition is not statistically important.

- If an indicator line segment is green, the NAD is displaying a normal network condition.
- If an indicator line segment displays red, the NAD is letting you know that a load condition exists.

  This is not necessarily a problem, but indicates that you should be aware of this condition.

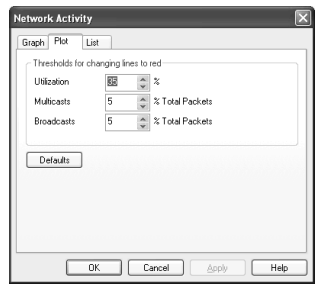
  - Load conditions can mean different things depending on where the red vs. blue vs. green lines appear. Typically, a red line means that a threshold has been overcome. Blue lines display on the side where the threshold may be an indication of trouble.
  - By default, red lines will be displayed if broadcast or multicast packets are representing more than 10% of total network utilization or if utilization goes over 35%.

Things to note:

- Error thresholds can be set in the Display Settings dialog.
- The gray area behind the current display is the outline of the last Network Vital Signs.
- NAD information can be saved to a comma delimited file by selecting File > Save Mode in Comma Delimited Format.

Display Properties

Display properties can be set by right-clicking on the display or by clicking the Settings button. The **Display Properties** dialog offers configuration options for the components of the display.



- "Utilization %" spinbox—allows you to select the number of utilizations per packet.
- "Multicasts % Total Packets" spinbox—allows you to select the number of multicasts per total packets.
- "Broadcasts % Total Packets" spinbox—allows you to select the number of broadcasts per total packets.

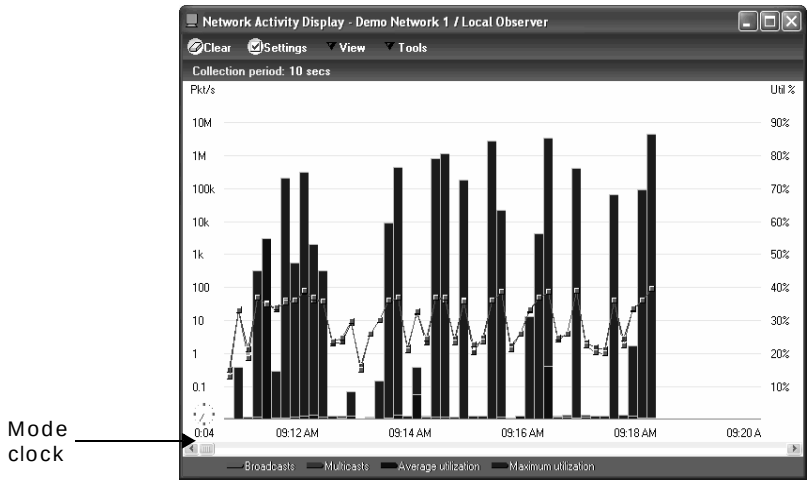
Right-Click Menu

Right-clicking on the dial will display the **Display Properties** dialog for Network Activity Display – Dial View.

Graph View

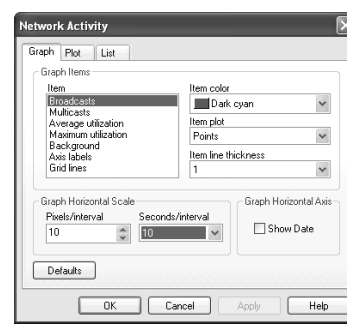
The NAD display in graph mode has a slightly different setup. Please note that the **mode clock** is located at the intersection of the X and Y axis of the display in graph

mode. The clock counts down the number of seconds left in the “Seconds/Interval” time period until data will be written to the display.



Display Properties

Display properties can be set by right-clicking on the display or by clicking the icon. The **Display Properties** dialog offers configuration options for the components of the display.



- “Item” dropdown—allows you to select which item will be configured.
- “Item color” dropdown—allows you to select the color of the item listed in the “Item” list box.
- “Item plot” dropdown—allows you to select the item to be displayed as Lines, Points, or Bars.
- “Item line thickness” dropdown—allows you to select the thickness of the displayed line in pixels. This option is only available for items that have been defined as a “Line” in the “Item plot” dialog.

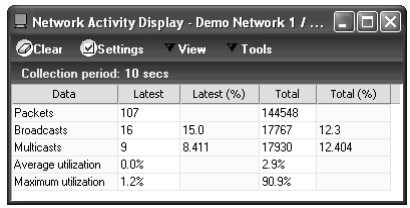
Graph horizontal scale:

- “Pixels/interval” spinbox—allows you to set how many pixels each interval display will occupy.
- “Seconds/interval” dropdown—allows you to set the number of seconds Observer will average before displaying interval information.

Right-Click Menu

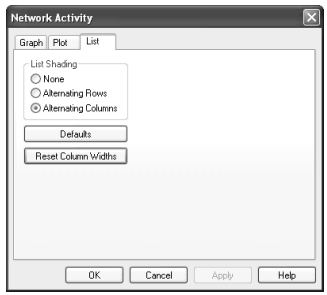
Right-clicking on the graph will display the **Display Properties** dialog for Network Activity Display – Graph View. **Display Properties** on page 91

List View



Display Properties

The Network Activity List View has only one display property option. To reset the columns to their default widths, click on the icon or go to Mode Commands > Display Properties. The following dialog will be displayed:



To reset column widths to their default values, click YES. To leave them in their present state, click NO.

Right-Click Menu

Right-clicking on the list will display the **Display Properties** dialog for Network Activity Display – List View. see “Display Properties” on page 92.

Network Errors by Station Mode

The Network Errors by Station mode displays network error packets broken down by the source (station) of the error and the type of error packet.

Menu Path

Choose **Statistics->Network Errors by Station**. Click the Start button to start running the mode.

Purpose

Network Errors by Station tracks and shows slightly different error counts depending on the access method of the network you are monitoring: Ethernet, FDDI, Token Ring, or Wireless. Screenshots in this section show Ethernet Errors by Station.

To track Ethernet errors by station, you must use a Network Instruments' ErrorTrak™ driver and a certified network adapter card.

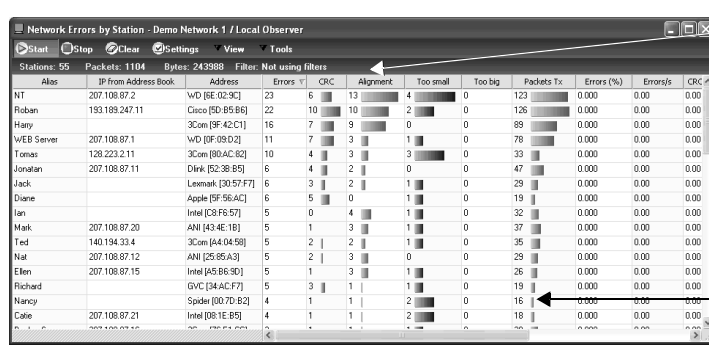
Please check Network Instruments' Web site for more information about the current set of supported cards and new drivers.

Available Views

- Graph View
- 3D Chart and Pie Views
- 3D Chart and Pie Views

Graph View

The Network Errors by Station – Graph View display consists of the standard summation header, packet and error rate dials, error summary registers, and the station error list box.



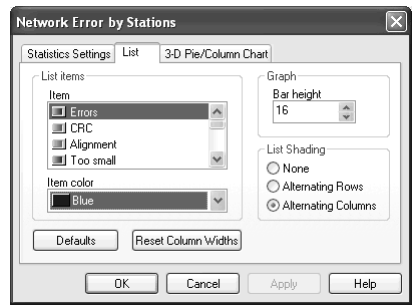
- The summation header displays the number of stations and the total number of packets analyzed.
- The station error list box shows each station that has sent an error packet and the number and type of errors. Additionally, error rates (value per second) are displayed and "% Errors/Total packets" statistic is displayed. The "% Errors/Total packets" statistic is the total number of error packets, divided by the total number of packets times 100. In formula format it would look like:

((total error packets) / (total number of station packets)) * 100

This statistic provides a good "grade" of a particular station's error activity.

Display Properties

Display properties can be set by right-clicking on the display and selecting "Display properties" or by clicking the icon. The **Display Properties** dialog offers configuration options for the components of the display.

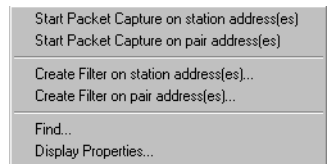


- "Item" dropdown—allows you to select the item to be configured.
- "Item color" dropdown—lets you select the color of the item listed in the "Item" list box.

Graph:

- "Bar height" spinbox—lets you configure the bar height in pixels.

Right-Click Menu


Start Packet Capture on station address(es)
Start Packet Capture on pair address(es)
Create Filter on station address(es)...
Create Filter on pair address(es)...
Find...
Display Properties...

- Start Packet Capture on station address(es)—activates the Filters dialog.
- Start Packet Capture on pair address(es)—activates the Filters dialog.

- Create Filter on station address(es)—activates the Filters dialog.
- Create Filter on pair address(es)—activates the Filters dialog.
- Find—displays the Find dialog.
- Display Properties—displays the Display Properties dialog.

3D Chart and Pie Views

Observer also offers 3D bar chart and pie views of Network Errors by Station. Simply click the 3D bar or Pie icon on the left side of the window. You can change colors and other display properties by right-clicking the chart and selecting **Display Properties** from the pop-up menu.

Network Vital Signs Mode

The Network Vital Signs mode shows the current network activity mapped with current error conditions on your network.

This section describes the Vital Signs as displayed for standard Ethernet analysis. For FDDI Vital signs, see “FDDI Network Vital Signs” on page 162. For Wireless Vital signs, see “Wireless Vital Signs” on page 163.

Menu Path

Statistics->Network Vital Signs

Purpose

The Network Vital Signs display gives you a complete snapshot of error conditions and of their importance in the context of current network activity. Aggregate problems found here can be pinned down to a specific station using the “Errors by Station mode.”

> The Ethernet Network Vital Signs will ONLY show errors that are available with your specific NDIS driver. To see what errors your driver supports, select **Options > Selected Probe or SNMP Device Properties > Probe Parameters** tab. The area under “Network errors that NIC NDIS drivers claims to provide” will show which NDIS errors your network card is capable of counting.

The importance of the error condition is key when trying to determine the severity of a particular error. For example, 50% CRC packet errors is not a problem if the sample size (total activity) is two packets. On the other hand, 10% CRC packet errors during a busy traffic period represents a critical problem.

Observer’s Network Vital Signs informs you at a glance as to the error condition and its severity with respect to traffic conditions by combining graphical shapes with specific color codes.

As with the Network Activity Display, the following colors have specific meanings:

- A yellow line anywhere in the display represents an idle condition. In other words, no matter what your display is telling you, activity is so low that the errors are not statistically important.
- A green line shows normal network activity and error counts.
- A red line indicates error counts out of “normal” range. When a red line condition is displayed.

  A red line will be displayed when the following default error counts are encountered:

  -Utilization goes over 35%.
  -CRC & packets too small represent more than 25% of the total traffic.
  -Packets too big represent over 1% of total traffic.
- Whenever a red line (i.e. a critical condition) is displayed, all of the formerly green lines turn blue to highlight the network state.

You cannot start or stop this mode. When the mode is displayed, it is automatically started. To stop the mode, simply close the mode window. The Network Vital Signs mode can be viewed in graph, dial, or list views.

Vital Sign information can be saved to a comma delimited file by choosing File > Save Mode in Comma Delimited Format.

Setup Properties

Setup options are the same for graph, dial, and list views.

- “Run collision test” checkbox—when selected, the collision test is run.

If your network NDIS driver supports collisions (see Options > Selected Probe or SNMP Device Properties > Probe Parameters tab) you can turn on Observer’s collision testing. This is done by clicking the COLLISION EXPERT button on the Network Vital Signs selection bar.

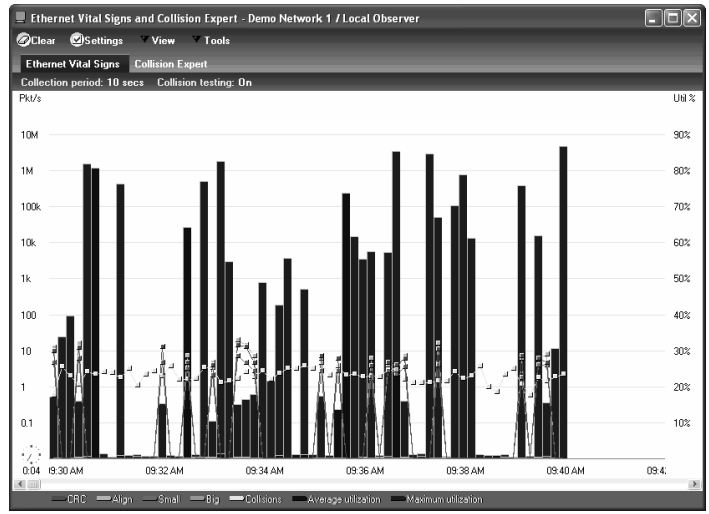
When this option is on, Observer will burst 100 Pkts/sec and listen to see how many packets collide with other packets. This method was considered the best way to see if your network has a problem with collisions since NDIS drivers will only display collisions when the packet sent from the PC is collided with. If you are showing

collisions, this means that some station on your network is not respecting the traffic of other stations. see “Collision Expert Analysis” on page 100.

Available Views

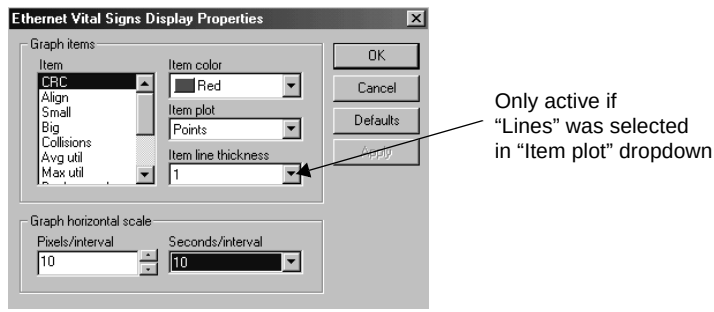
- Graph View
- Dial
- List

Graph View



Display Properties

Display properties can be set by right-clicking on the display or by clicking the icon. The **Display Properties** dialog offers configuration options for the components of the display.



- “Item” dropdown—allows you to select which item will be configured.

- “Item color” dropdown—allows you to select the color of the main display item.
- “Item plot” dropdown—offers a choice of the item to be displayed as Lines, Points, or Bars.
- “Item line thickness” dropdown—offers a choice of the thickness of the displayed item in pixels. This option is only available for items that have been defined as a “Line” in the “Item plot” dialog.

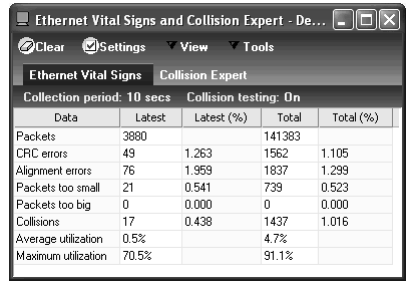
Graph horizontal scale:

- “Pixels/interval” spinbox—allows you to select how many pixels each interval display will occupy.
- “Seconds/interval” dropdown—allows you to set the number of seconds Observer will average before displaying interval information.

Right-Click Menu

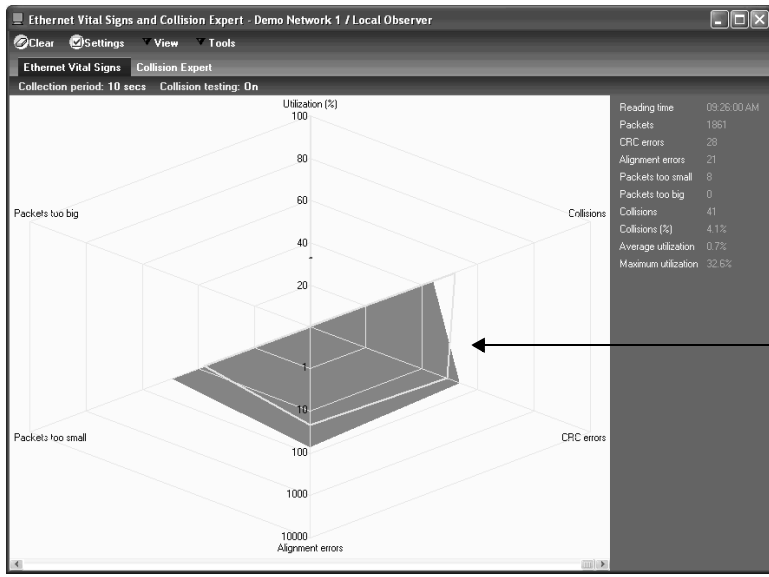
Right-clicking on the graph will display the **Display Properties** dialog for Network Vital Signs – Graph View. see “Display Properties” on page 97.

Summary List View



Data	Latest	Latest (%)	Total	Total (%)
Packets	3880		141383	
CRC errors	49	1.263	1562	1.105
Alignment errors	76	1.959	1837	1.299
Packets too small	21	0.541	739	0.523
Packets too big	0	0.000	0	0.000
Collisions	17	0.438	1437	1.016
Average utilization	0.5%		4.7%	
Maximum utilization	70.5%		91.1%	

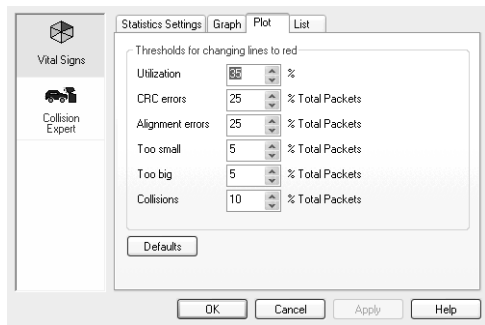
Plot View



The gray area behind the current display is the outline of the last Network Vital Signs

Display Properties

Different error thresholds can be set in the **Display Properties** dialog.



- “Utilization %” spinbox—allows you to select the utilization threshold number.
- “CRC errors % Total Packets” spinbox—allows you to select the CRC errors threshold number.
- “Alignment errors % Total Packets” spinbox—allows you to select the alignment errors threshold number.
- “Too small % Total Packets” spinbox—allows you to select the too small number threshold number.
- “Too big % Total Packets” spinbox—allows you to select the too big threshold number.
- “Collisions % Total Packets” spinbox—allows you to select the collision threshold number. % of Total Packets refers to the number of *test* packets that have collided (not the total number of packets on your network).

Right-Click Menu

Right-clicking on the dial will display the **Display Properties** dialog for Network Vital Signs – Dial View.

Collision Expert Analysis

This mode examines all stations that were active immediately prior, during, and just after a collision occurs. These stations will be tracked and aberrant stations (stations that are consistently present or retransmitting at the time of the collision) are flagged and tracked. Should one (or more) stations show consistently high retransmissions around collisions, the station or stations will be identified. Expert logic will show collision events and statistically summarize those stations that show exceptional collision-causing rates. The summary area of the Collision Expert Analysis mode will make recommendations regarding what stations should be checked for failing hardware. Replacement of the NIC on the aberrant station is almost always the result of finding a station causing collisions, but checking cabling is another option.

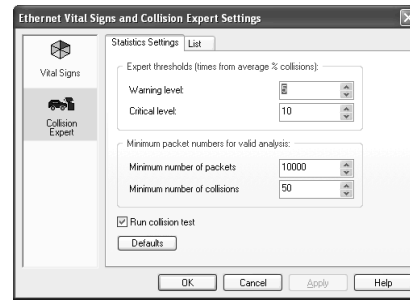
The Collision Expert display shows the top 10 colliders on your network, how many packets and collisions were observed and the percent of collisions caused by each of the top 10 colliders.

The bottom half of the Collision Expert Analysis dialog shows the Expert Analysis section displaying the collision events and an analysis summary of exceptional events.

> The Collision Expert Analysis dialog must be run for at least 10 minutes to provide accurate results. The longer it runs, the better the data.
>
> It is best to run the Collision Expert Analysis mode during heavy network activity times.

Setup Properties

The **Setup** dialog for Collision Expert Analysis lets you configure thresholds for warnings about aberrant stations.



Expert thresholds (times from average % collisions):

- "Warning level" spinbox—sets the multiplier that Expert mode will use to warn of events. For example, if this is set to "5," the Expert will warn when a station's collision rate is five times the network average.
- "Critical level" spinbox—the number (multiplier) that the Expert will warn when the station's collisions become critical. For example, if this is set to "10", the station will be flagged critical when its collision rate is 10 times the network average.

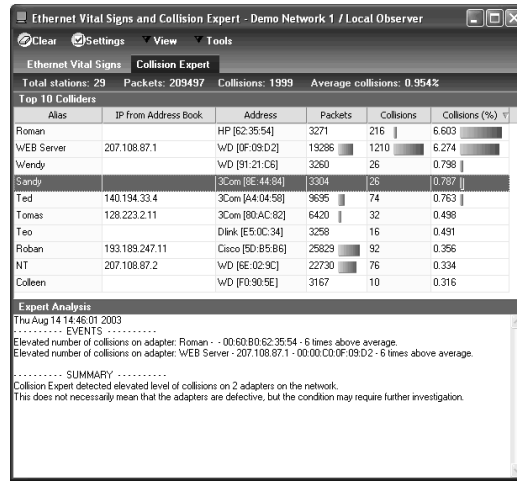
Minimum packet numbers for valid analysis:

- "Minimum number of packets" spinbox—this is the minimum number of packets that any station must send/receive prior to the Expert acknowledging the station for analysis. This value is set to disregard stations that may have a high number of collisions, but not enough traffic to be statistically valid. For example, if a station has 50% collisions, but only 20 packets, it would not be considered statistically valid for analysis.

"Minimum number of collisions" spinbox—this is the minimum number of collisions that any station must display prior to the Expert acknowledging the station for analysis.

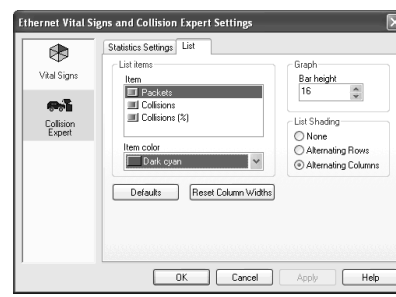
List View

To start Collision Expert Analysis, click the Collision Expert Analysis tab.



Display Properties

Display properties can be set by right-clicking on the display or by clicking the icon. The **Display Properties** dialog offers configuration options for the components of the display.

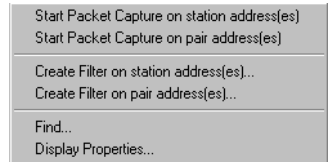


- "Item" list—allows you to select which item will be configured.
- "Item color" dropdown—allows you to select the color of the main display item.

Graph:

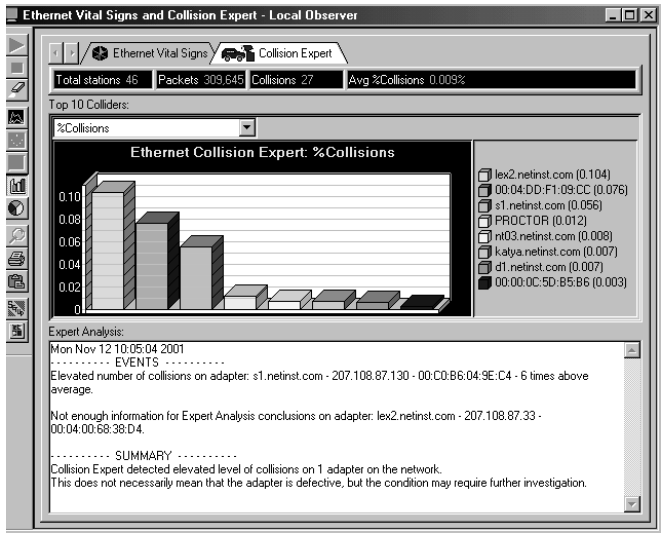
- "Bar height" spinbox—allows you to configure the bar thickness in pixels.

Right-Click Menu

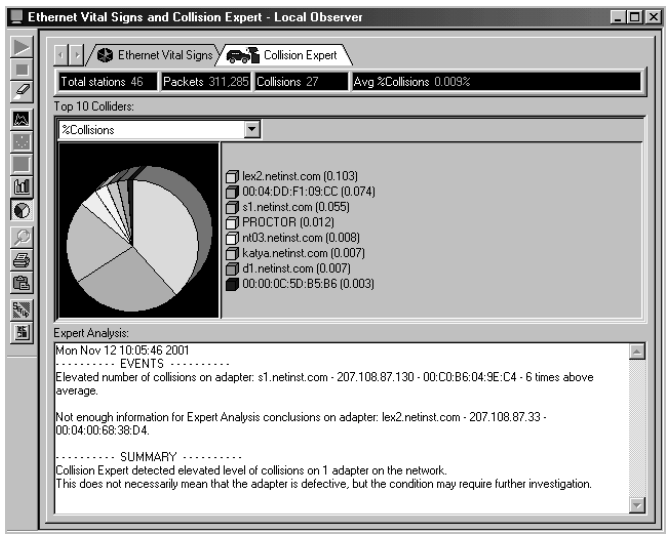

Start Packet Capture on station address(es)
Start Packet Capture on pair address(es)
Create Filter on station address(es)...
Create Filter on pair address(es)...
Find...
Display Properties...

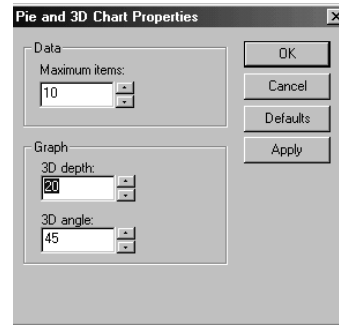
- Start Packet Capture on station address(es)—activates the Filters dialog.
- Start Packet Capture on pair address(es)—activates the Filters dialog.
- Create Filter on station address(es)—activates the Filters dialog.
- Create Filter on pair address(es)—activates the Filters dialog.
- Find—displays the Find dialog.
- Display Properties—displays the Display Properties dialog.

3D Chart View


Ethernet Vital Signs and Collision Expert - Local Observer
Ethernet Vital Signs
Collision Expert
Total stations 46
Packets 309,645
Collisions 27
Avg %Collisions 0.009%
Top 10 Colliders:
%Collisions
Ethernet Collision Expert: %Collisions
0.10
0.08
0.06
0.04
0.02
0
lex2.netinst.com (0.104)
00:04:DD:F1:09:CC (0.076)
s1.netinst.com (0.056)
PROCTOR (0.012)
nt03.netinst.com (0.008)
katya.netinst.com (0.007)
d1.netinst.com (0.007)
00:00:0C:5D:B5:B6 (0.003)
Expert Analysis:
Mon Nov 12 10:05:04 2001
---------- EVENTS ----------
Elevated number of collisions on adapter: s1.netinst.com - 207.108.87.130 - 00:C0:B6:04:9E:C4 - 6 times above average.
Not enough information for Expert Analysis conclusions on adapter: lex2.netinst.com - 207.108.87.33 - 00:04:00:68:38:D4.
---------- SUMMARY ----------
Collision Expert detected elevated level of collisions on 1 adapter on the network.
This does not necessarily mean that the adapter is defective, but the condition may require further investigation.

Pie View


Ethernet Vital Signs and Collision Expert - Local Observer
Ethernet Vital Signs
Collision Expert
Total stations 46
Packets 311,285
Collisions 27
Avg %Collisions 0.009%
Top 10 Colliders:
%Collisions
lex2.netinst.com (0.103)
00:04:DD:F1:09:CC (0.074)
s1.netinst.com (0.055)
PROCTOR (0.012)
nt03.netinst.com (0.008)
katya.netinst.com (0.007)
d1.netinst.com (0.007)
00:00:0C:5D:B5:B6 (0.003)
Expert Analysis:
Mon Nov 12 10:05:46 2001
---------- EVENTS ----------
Elevated number of collisions on adapter: s1.netinst.com - 207.108.87.130 - 00:C0:B6:04:9E:C4 - 6 times above average.
Not enough information for Expert Analysis conclusions on adapter: lex2.netinst.com - 207.108.87.33 - 00:04:00:68:38:D4.
---------- SUMMARY ----------
Collision Expert detected elevated level of collisions on 1 adapter on the network.
This does not necessarily mean that the adapter is defective, but the condition may require further investigation.



Data:

- “Maximum items” spinbox—allows you to select the maximum items to be displayed.

Graph:

- “3D depth” spinbox—allows you to select the 3D depth of the graph items.
- “3D angle” spinbox—allows you to select the 3D depth of the graph items.

Pair Statistics (Matrix) Mode

Tracks all conversation pairs on your network and allows you to examine the details of a specific conversation for analysis.

Menu Path

Statistics->Pairs Statistics (Matrix)

Purpose

The dial mode of the Pair Statistics shows a matrix of all conversations, with line thickness representing the amount of data flowing between each pair.

A number of statistics are kept for each pair, including the packets and bytes in each direction, and the latency for each direction. Latency can further be configured to be ignored after a certain number of milliseconds. see “Setup Properties (all views)” on page 106. Latency configuration will make Observer only track packets that are part of a true conversation flow, as opposed to packets that may be the result of someone going to get a cup of coffee, for example.

In the course of a few hours, you will find that almost every station on your segment will have some sort of conversation with every other station. This is why Observer provides the ability to “zoom” in on a specific conversation on the top of your display.

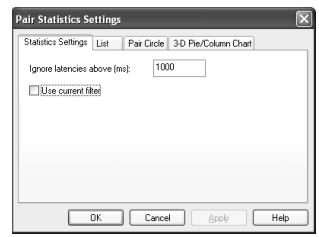
This will make watching one conversation amongst many hundreds much easier. To zoom in, highlight the pair you are interested in and it will be displayed on the top of the Pair dialog.

Available Views

- Graph View
- Pair Circle View
- List View
- 3D Column Chart View
- 3D Pie Chart View

Setup Properties (all views)

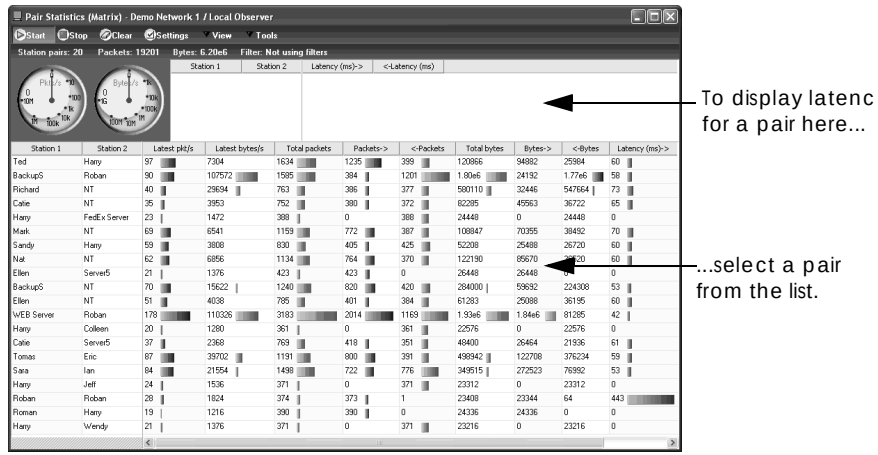
The Setup dialog is where mode specific setup information options are set. You can access the Setup dialog by clicking the icon or by selecting Mode Commands > Setup.



- "Ignore latencies above (ms)" textbox—sets the latency time that above which, Observer will ignore packets. Latency configuration will make Observer only track packets that are part of a true conversation flow.
- "Use current filter" checkbox—when checked, Observer will use the current filter showing mode information. When unchecked, Observer will display mode information on all stations, using no filter.

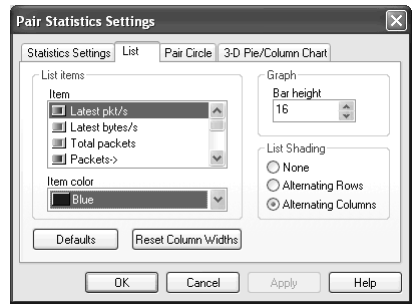
List View

The List view of Pair Statistics shows all pairs and the latency times between conversations.



Display Properties

Display properties can be set by right-clicking on the display or by clicking the Settings button. The **Display Properties** dialog offers configuration options for the components of the display.



- "Item" dropdown—allows you to select the item to be configured.
- "Item color" dropdown—allows you to select the color of the item listed in the "Item" list box.

Graph:

- "Bar height" spinbox—lets you configure the bar thickness in pixels.

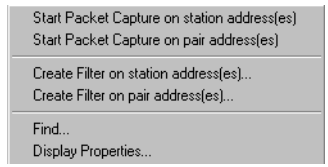
Station names—allows you to select from one of the following:

- Alias option button—allows you to view stations by alias name.

- IP address option button—allows you to view stations by IP address.
- MAC address option button—allows you to view stations by MAC address.

Right-Click Menu

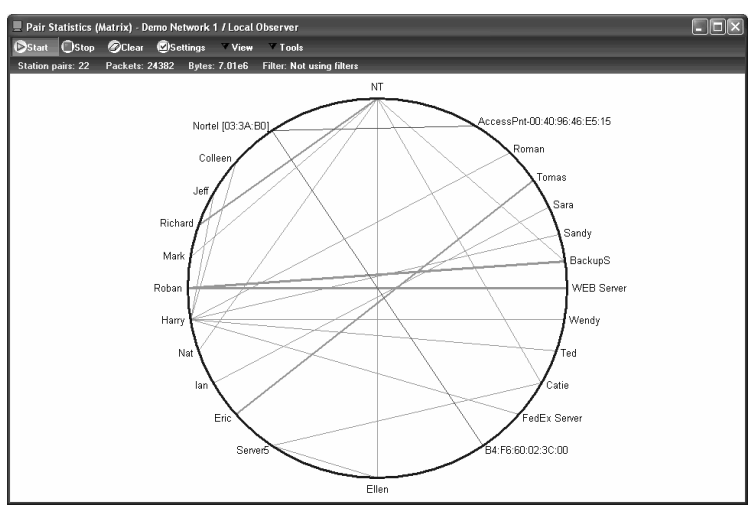
The Pair Statistics – Graph View right-click menu offers a number of filtering options, as well as access to the Display Properties dialog.


Start Packet Capture on station address(es)
Start Packet Capture on pair address(es)
Create Filter on station address(es)...
Create Filter on pair address(es)...
Find...
Display Properties...

- Start Packet Capture on station address(es)—activates the Filters dialog.
- Start Packet Capture on pair address(es)—activates the Filters dialog.
- Create Filter on station address(es)—activates the Filters dialog.
- Create Filter on pair address(es)—activates the Filters dialog.
- Find—displays the Find dialog.
- Display Properties—displays the Display Properties dialog.

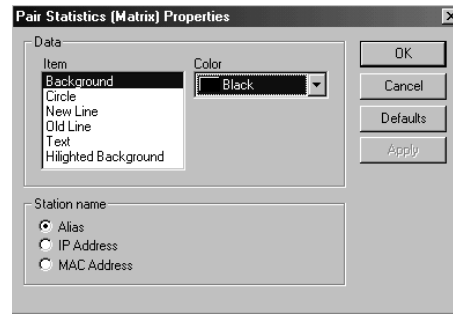
Pair Circle View

The pair circle view of Pair Statistics provides a view of all the network conversations in one convenient map. The thickness of each line represents the amount of data flowing between the stations. The thickness grows in a logarithmic pattern. Additionally, there are two different colors for new and older traffic.



Display Properties

Display properties can be set by right-clicking on the display or by clicking the Settings button. The **Display Properties** dialog offers configuration options for the components of the display.

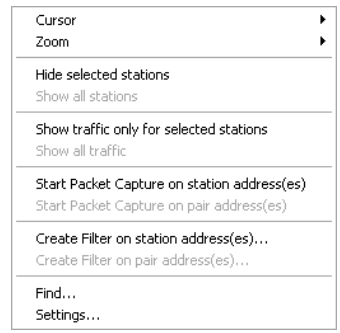


- "Item" list—allows you to select the item to be configured.
- "Color" dropdown—allows you to select the color of the item listed in the "Item" list box

Station name—allows you to select from one of the following:

- Alias option button—allows you to view stations by alias name.
- IP Address option button—allows you to view stations by IP address.
- MAC Address option button—allows you to view stations by MAC address.

Right-Click Menu

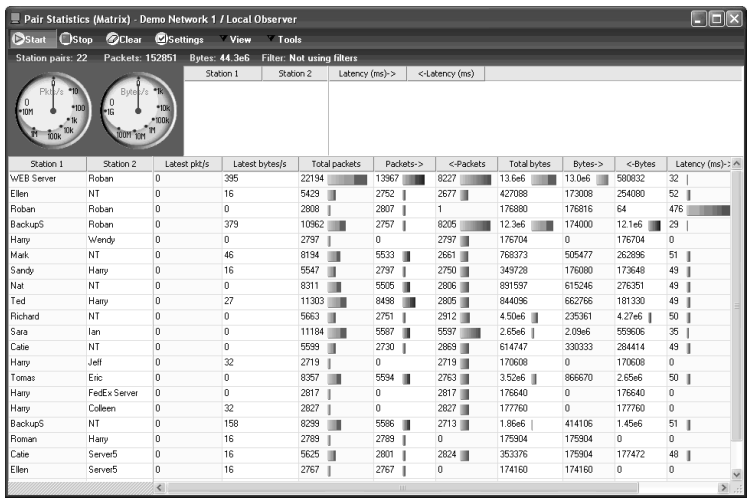


- Cursor—allows you to select the cursor type. You can select from the following: arrow, hand, or magnify.
- Zoom—allows you to select the view mode. You can select from the following: 1x, 2x, 5x, 10x, 20x, or 40x.
- Hide selected stations—hides the highlighted station.

- Show all stations—shows all stations.
- Show traffic only for selected stations—shows all traffic for the highlighted stations.
- Show all traffic—shows all traffic on the network.
- Start Packet Capture on station address(es)—activates the Filters dialog.
- Start Packet Capture on pair address(es)—activates the Filters dialog.
- Create Filter on station address(es)—activates the Filters dialog.
- Create Filter on pair address(es)—activates the Filters dialog.
- Find—displays the Find dialog.
- Settings—displays the Settings dialog.

List View

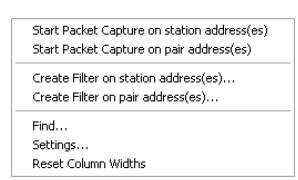
The List View of Pair Statistics provides a tabular view of all the network conversations in one convenient map.



Station 1	Station 2	Latest pkt/s	Latest bytes/s	Total packets	Packets->	<-Packets	Total bytes	Bytes->	<-Bytes	Latency (ms)->
WEB Server	Roban	0	395	22194	13967	8227	13.6e6	13.0e6	580832	32
Ellen	NT	0	16	5429	2752	2677	427088	173008	254080	52
Roban	Roban	0	0	2808	2807	1	176880	176816	64	476
BackupS	Roban	0	379	10962	2757	8205	12.3e6	174000	12.1e6	29
Harry	Wendy	0	0	2797	0	2797	176704	0	176704	0
Mark	NT	0	46	8194	5533	2661	768373	505477	262896	51
Sandy	Harry	0	16	5547	2797	2750	349728	176080	173648	49
Nat	NT	0	0	8311	5505	2806	891597	615246	276351	49
Ted	Harry	0	27	11303	8498	2805	844096	662766	181330	49
Richard	NT	0	0	5663	2751	2912	4.50e6	235361	4.27e6	50
Sara	Ian	0	0	11184	5587	5597	2.65e6	2.09e6	559606	35
Catie	NT	0	0	5599	2730	2869	614747	330333	284414	49
Harry	Jeff	0	32	2719	0	2719	170608	0	170608	0
Tomas	Eric	0	0	8357	5594	2763	3.52e6	866670	2.65e6	50
Harry	FedEx Server	0	0	2817	0	2817	176640	0	176640	0
Harry	Colleen	0	32	2827	0	2827	177760	0	177760	0
BackupS	NT	0	158	8299	5586	2713	1.86e6	414106	1.45e6	51
Roman	Harry	0	16	2789	2789	0	175904	175904	0	0
Catie	Server5	0	16	5625	2801	2824	353376	175904	177472	48
Ellen	Server5	0	16	2767	2767	0	174160	174160	0	0

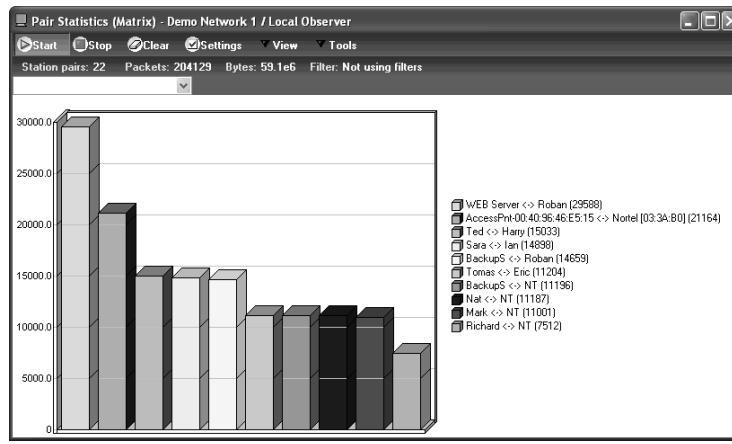
Right-Click Menu

The Pair Statistics – List View right-click menu offers a number of filtering options, as well as access to the **Display Properties** dialog.

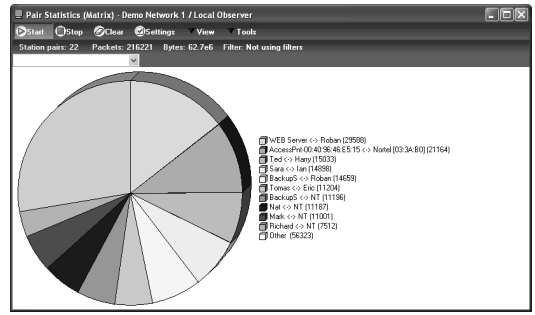


- Start Packet Capture on station address(es)—activates the Filters dialog.
- Start Packet Capture on pair address(es)—activates the Filters dialog.
- Create Filter on station address(es)—activates the Filters dialog.
- Create Filter on pair address(es)—activates the Filters dialog.
- Find—displays the Find dialog.
- Settings—displays the Display Properties dialog.
- Reset Column Widths—Returns the column widths to their original settings.

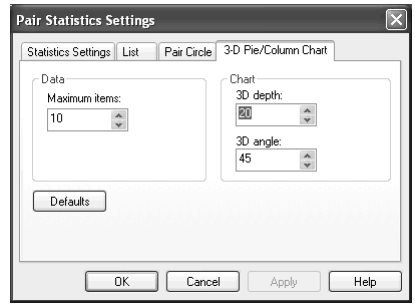
3D Column Chart View



3D Pie Chart View



3D Chart and Pie View Display Properties



Data:

- “Maximum items” spinbox—allows you to select the maximum items to be displayed.

Graph:

- “3D depth” spinbox—allows you to select the 3D depth of the graph items.
- “3D angle” spinbox—allows you to select the 3D depth of the graph items.

Protocol Distribution Statistics Mode

Displays network protocol usage statistics.

Menu Path

Statistics -> Protocol Distribution Statistics

Purpose

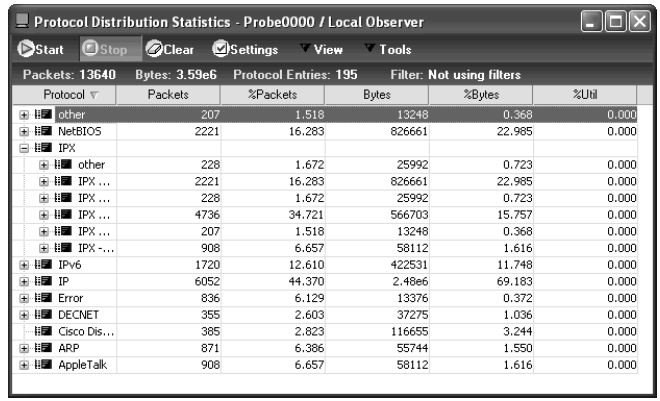
Protocol Distribution mode shows how your network’s data is being distributed based on protocol. Viewing protocols can give you an idea of what servers and applications

are being used and if there are any unknown or misconfigured protocols on your network.

You can have a maximum number of the following for each subprotocol: 512 for UPD, 512 for TCP, and 512 for Frame.

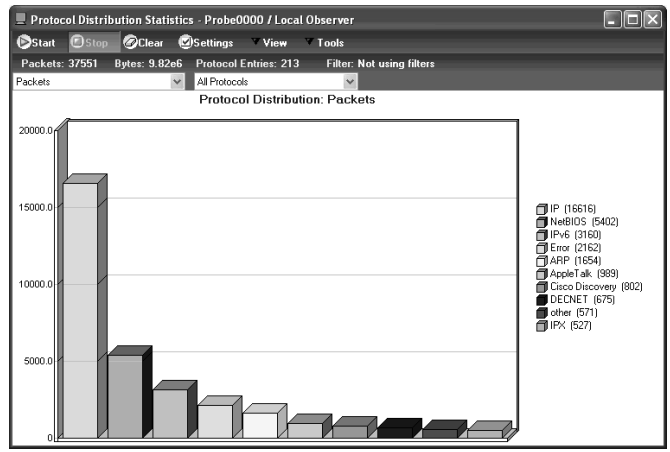
The Protocol Distribution mode displays Protocol Statistics in list, 3D chart, and pie views. The Protocol Distribution mode can be activated from the main window by selecting Statistics > Protocol Distribution.

Protocol Tree View

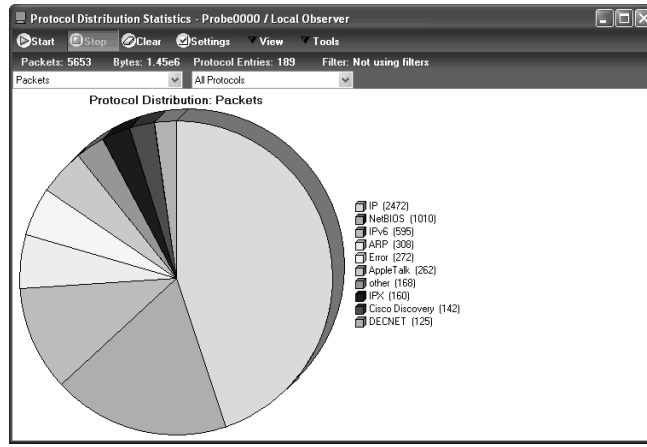


Protocol	Packets	%Packets	Bytes	%Bytes	%Util
other	207	1.518	13248	0.368	0.000
NetBIOS	2221	16.283	826661	22.985	0.000
IPX					
other	228	1.672	25992	0.723	0.000
IPX ...	2221	16.283	826661	22.985	0.000
IPX ...	228	1.672	25992	0.723	0.000
IPX ...	4736	34.721	566703	15.757	0.000
IPX ...	207	1.518	13248	0.368	0.000
IPX -...	908	6.657	58112	1.616	0.000
IPv6	1720	12.610	422531	11.748	0.000
IP	6052	44.370	2.48e6	69.183	0.000
Error	836	6.129	13376	0.372	0.000
DECNET	355	2.603	37275	1.036	0.000
Cisco Dis...	385	2.823	116655	3.244	0.000
ARP	871	6.386	55744	1.550	0.000
AppleTalk	908	6.657	58112	1.616	0.000

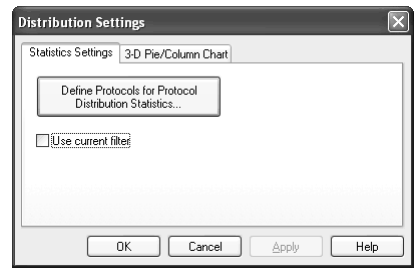
3D Column Chart View



3D Pie Chart View

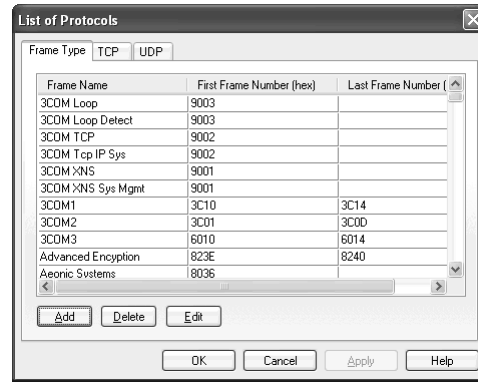


Settings

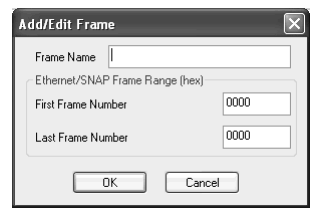


- “Use Current Filter” checkbox—Check this box if you want only packets matching the current filter criteria to be used for the Protocol Distribution display.

- “Define Protocols for Protocol Distribution Statistics”—displays a dialog that lets you define the protocols to be displayed:



- Displays the Frame Name, First Port (Hex), and Last Port (Hex).
- Add button—displays the Add/Edit SubProtocol dialog, where you can define the frame name and range for the protocol you are defining:



RMON Tables

See “Using the RMON Console” on page 415.

Router Observer

Shows router utilization rates. To accurately assess utilization rates, you must enter the correct bandwidth speed in the **Settings** dialog.

Menu Path

Statistics->Router Observer

Purpose

Router Observer lets you to look at a router (or group of routers) in real time to see their utilization rate. You can quickly find out if a router is acting as a bottleneck and, if so, whether the source of the packets clogging the router are incoming or outgoing (or

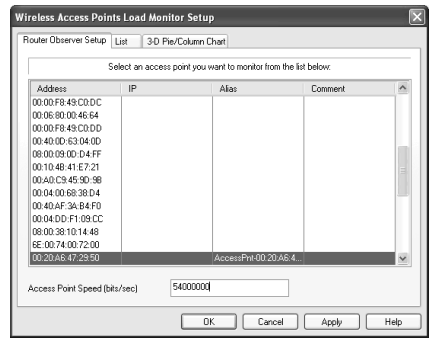
both). By examining historical information you can tell whether this is a chronic problem, which might indicate the need for a faster connection, or an acute problem, which might indicate a failure of some sort. Observer does this passively; therefore, the Access Point is not affected.

Available Views

- List and Dials View
- 3D Column Chart View
- Pie View

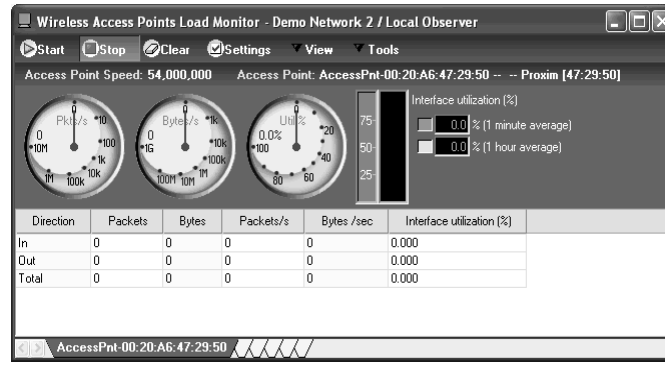
Settings

To use the Access Points Load Monitor you must first configure the mode. This is done by clicking the **Settings** button, which will then display the **Access Points Load Monitor Setup** dialog.



- Select a Router from the list (of stations). Do so by highlighting the station. This list is read from your address/alias list.
- “Router speed (Baud)” textbox—this is the device’s defined throughput (in other words, enter 54000000 for 802.11a/g access points, or 11000000 for 802.11b access points.

List and Dials View

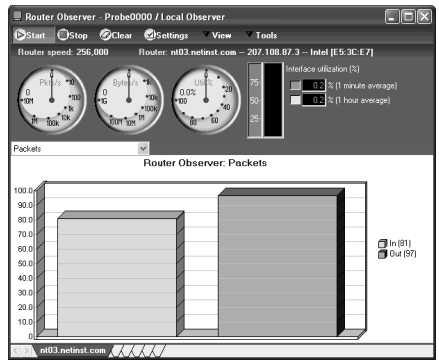


Dials provide a “heads-up” immediate display of packets/second, bits/second, and interface utilization.

Right-Click Menu

- Settings—displays the Settings dialog.
- Reset Column Widths—Resets the columns to their original widths.

3D Column Chart View



Pie View

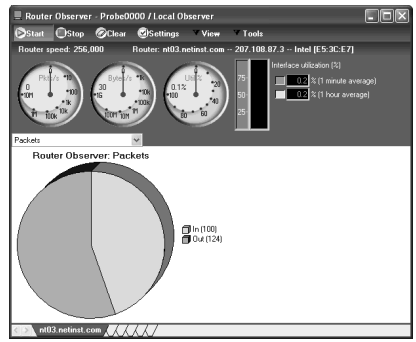
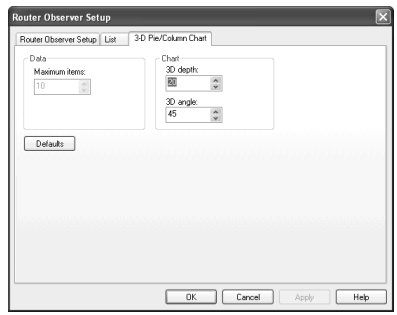


Chart and Pie View Display Properties



Data:

- “Maximum items” spinbox—allows you to select the maximum items to be displayed.

Graph:

- “3D depth” spinbox—allows you to select the 3D depth of the graph items.
- “3D angle” spinbox—allows you to select the 3D depth of the graph items.

Access Points Load Monitor

Shows wireless Access Points utilization rates. Available only when the current Probe (or Probe instance) is capturing packets from a wireless network interface. Note that for Observer to accurately assess utilization rates, you must enter the correct bandwidth speed (i.e., 54000000 for 801.11a/802.11g, or 11000000 for 802.11b) in the **Settings** dialog.

Menu Path

Statistics->Access Points Load Monitor

Purpose

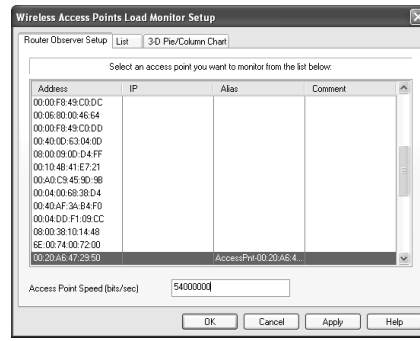
The Access Points Load Monitor lets you to look at an access point (or group of access points) in real time to see their utilization rate. You can quickly find out if an access point is acting as a bottleneck and, if so, whether the source of the packets clogging the AP are incoming or outgoing (or both). By examining historical information you can tell whether this is a chronic problem, which might indicate the need for a faster connection, or an acute problem, which might indicate a failure of some sort. Observer does this passively; therefore, the Access Point is not affected.

Available Views

- List and Dials View
- 3D Column Chart View
- Pie View

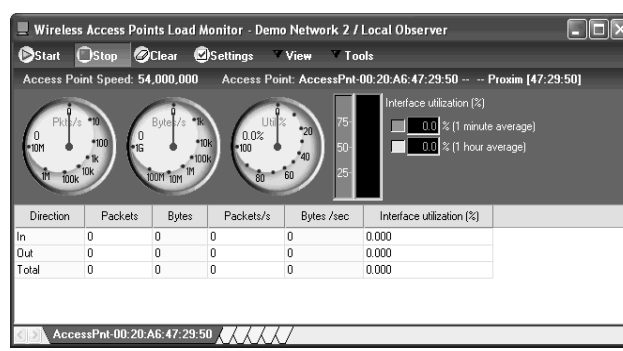
Settings

To use the Access Points Load Monitor you will need to first configure the mode. This is done by clicking the **Settings** button, which will then display the **Access Points Load Monitor Setup** dialog.



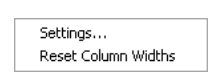
- Select a Router from the list (of stations). Do so by highlighting the station. This list is read from your address/alias list.
- "Router speed (Baud)" textbox—this is the device's defined throughput (in other words, enter 54000000 for 802.11a/g access points, or 11000000 for 802.11b access points.

List and Dials View



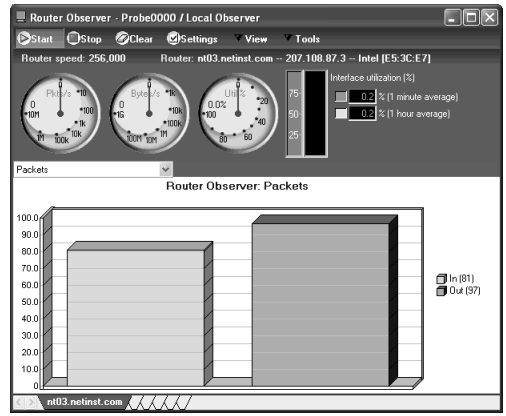
Dials provide a "heads-up" immediate display of packets/second, bits/second, and interface utilization.

Right-Click Menu



- Settings—displays the Settings dialog.
- Reset Column Widths—Resets the columns to their original widths.

3D Column Chart View



Pie View

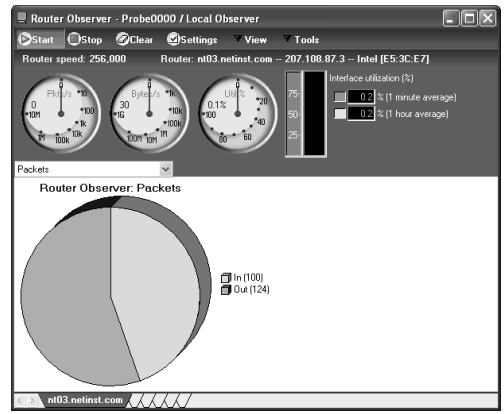
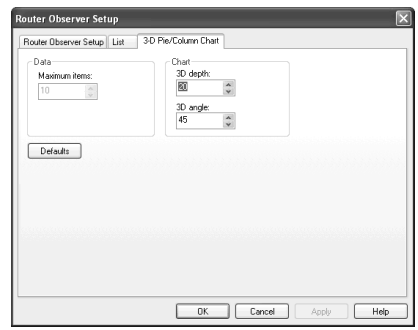


Chart and Pie View Display Properties



Data:

- “Maximum items” spinbox—allows you to select the maximum items to be displayed.

Graph:

- “3D depth” spinbox—allows you to select the 3D depth of the graph items.
- “3D angle” spinbox—allows you to select the 3D depth of the graph items.

Packet Size Distribution Statistics Mode

Shows statistics about the sizes of packets on your network.

Menu Path

Statistics->Packet Size Distribution

Purpose

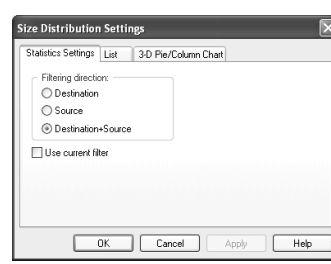
Size Distribution Statistics Mode shows all stations on your network (subject to your filter criteria) and each station’s traffic patterns broken down by the size of the packet. This information can help pinpoint network flow problems and identify stations or routers that are sending mostly small packets as opposed to larger packets.

The rest of the screen shows the size distribution, divided by packet size, in bytes. This is shown as a percentage (or total packets) for each address.

Size Distribution Statistics mode can be activated from the main window by selecting Statistics > Size Distribution Statistics.

Size Distribution is available in graph, list, 3D chart, and pie views. To begin collecting statistics, click the Start button.

Size Distribution Statistics Setup Properties



Filtering direction—allows you to specify the direction of traffic which Observer will display.

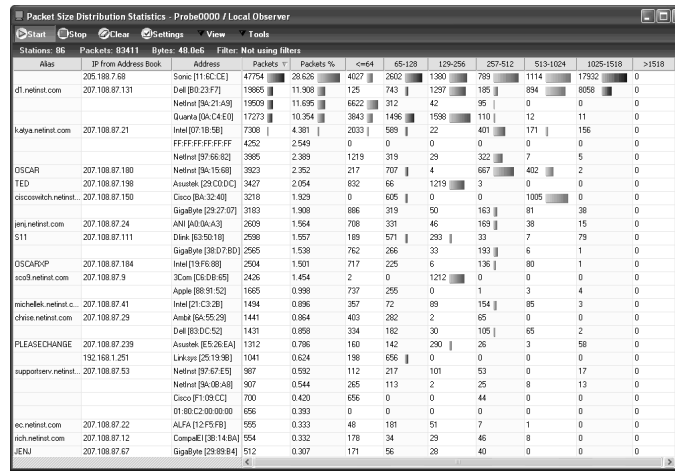
- “Destination” option button

- “Source” option button
- “Destination+Source” option button—in most cases, you will want to use the Destination+Source option.
- “Use current filter” checkbox—when checked, Observer will use the current filter when showing mode information. When not selected, Observer will display mode information on all stations, not using any filter.

Available Views

- List View
- 3D Column Chart View
- 3D Pie View

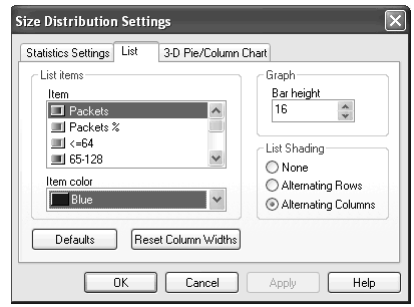
List View



By default, the stations listed are all the stations on your network. In other words, this is the “unfiltered” traffic. You can set Observer to view all traffic or filtered traffic in the **Size Distribution Statistics Setup** dialog. see “Packet Size Distribution Statistics Mode” on page 122.

Display Properties

Display properties can be set by selecting the right-click menu item or by clicking the Settings button. The **Settings** dialog offers configuration options for the components of the display.



- "Item" dropdown—allows you to select the item to be configured.
- "Item color" dropdown—lets you select the color of the item listed in the "Item" list.

Graph:

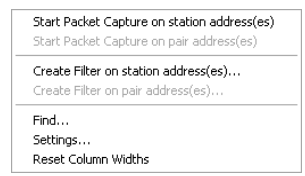
- "Bar height" spinbox—lets you configure the bar thickness in pixels.

Packet ranges:

- Show % option button—allows you to select the specific size range as a percentage of total traffic for the station.
- Show totals option button—allows you to select the specific size range as the total number of packets for the station.

Right-Click Menu

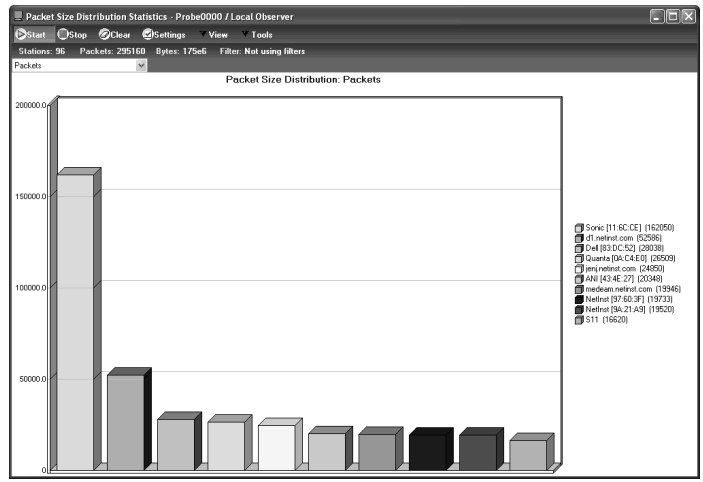
The Size Distribution Statistics right-click menu offers a number of filtering options, as well as access to the **Display Properties** dialog.



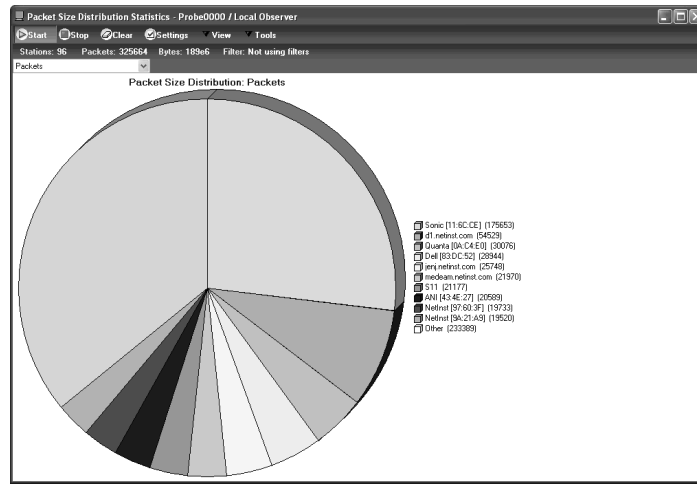
- Start Packet Capture on station address(es)—activates the Filters dialog.
- Start Packet Capture on pair address(es)—activates the Filters dialog.
- Create Filter on station address(es)—activates the Filters dialog.
- Create Filter on pair address(es)—activates the Filters dialog.

- Find—displays the Find dialog.
- Settings—displays the Display Properties dialog.

3D Column Chart View



3D Pie View



Top Talkers Statistics Mode

Shows most active stations on your network, along with broadcast/multicast statistics.

Menu Path

Statistics->Top Talkers

Purpose

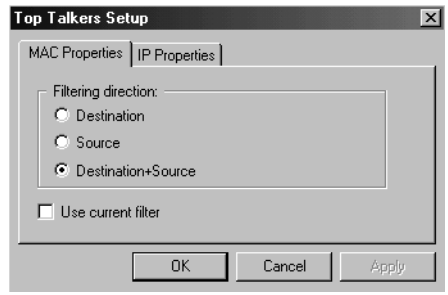
Top Talkers Statistics shows all stations on your network (subject to your filter criteria) and the Broadcast/Multicast statistics. This information provides detailed traffic flow statistics that can show a runaway station, a broadcast/multicast storm, or an unbalanced switch.

If you are considering implementing a switch, this information can help divide stations effectively for your switch. Once you have implemented a switch, using the switched version of this mode can verify balanced port loads.

The Top Talkers window can be activated from the main window by selecting Statistics > Top Talkers Statistics. You can choose MAC or IP view.

Top Talkers Setup Properties

MAC Properties Tab



Filtering direction—allows you to specify the direction of traffic Observer will display. Options are listed below:

- Destination option button
- Source option button
- Destination+Source option button—on most occasions, you would want to use the Destination+Source option.
- “Use current filter” checkbox—when selected, Observer will use the current filter showing mode information. When not selected, Observer will display mode information on all stations, not using any filter.

IP Properties Tab

- “Remove inactive IP address after (min)” spinbox—removes inactive IP addresses (IP addresses which have no packet flow activity) after the number of minutes entered in the dialog.
- “Maximum number of IP addresses” spinbox—allows you to enter the number of minutes before inactive IP addresses are removed.
- “Resolve IP addresses using DNS” checkbox—if you have DNS, Observer will attempt to resolve all IP addresses using their DNS name and display this resolution in the “DNS” column.
- “Use current filter” checkbox—when selected, Observer will use the current filter showing mode information. When not selected, Observer will display mode information on all stations, not using any filter.

Available Views

Top Talkers is available in Graph, List, 3D Chart, and Pie Views. Depending on what hardware and driver you have installed, the following tabs are available:

- MAC Tab
- IP Tab
- Wireless Types Tab (active for wireless analysis only)
- Wireless Speeds Tab (active for wireless analysis only)
- Wireless Latest Tab (active for wireless analysis only)

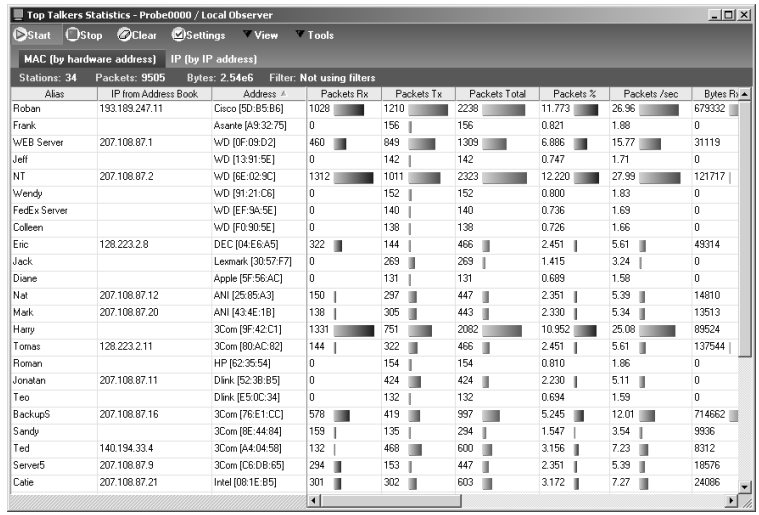
Right-Click Menu (all tabs)

The Top Talkers right-click menu offers a number of filtering options, as well as access to the **Display Properties** dialog.

- Start Packet Capture on station address(es)—starts a capture on highlighted station address(es).
- Start Packet Capture on pair address(es)—starts a capture on highlighted address(es) pairs.
- Create Filter on station address(es)—creates a filter on the highlighted station address(es) and activates the filter dialog.
- Create Filter on pair address(es)—creates a filter on the highlighted pair of address(es) and activates the filter dialog.

MAC Tab

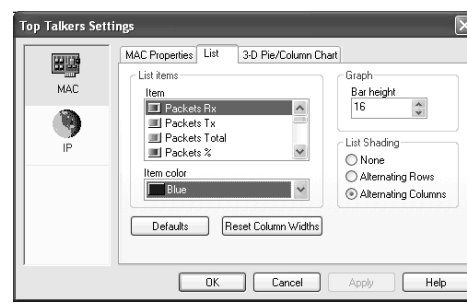
The MAC view offers a display of stations by MAC address.



Alias	IP from Address Book	Address	Packets Rx	Packets Tx	Packets Total	Packets %	Packets /sec	Bytes Rx
Roban	193.189.247.11	Cisco [5D:B5:B6]	1028	1210	2238	11.773	26.96	679332
Frank		Asante [A9:32:75]	0	156	156	0.821	1.88	0
WEB Server	207.108.87.1	WD [0F:09:D2]	460	849	1309	6.886	15.77	31119
Jeff		WD [13:91:5E]	0	142	142	0.747	1.71	0
NT	207.108.87.2	WD [6E:02:9C]	1312	1011	2323	12.220	27.99	121717
Wendy		WD [91:21:C6]	0	152	152	0.800	1.83	0
FedEx Server		WD [EF:9A:5E]	0	140	140	0.736	1.69	0
Colleen		WD [F0:90:5E]	0	138	138	0.726	1.66	0
Eric	128.223.2.8	DEC [04:E6:A5]	322	144	466	2.451	5.61	49314
Jack		Lexmark [30:57:F7]	0	269	269	1.415	3.24	0
Diane		Apple [5F:56:AC]	0	131	131	0.689	1.58	0
Nat	207.108.87.12	ANI [25:85:A3]	150	297	447	2.351	5.39	14810
Mark	207.108.87.20	ANI [43:4E:1B]	138	305	443	2.330	5.34	13513
Harry		3Com [9F:42:C1]	1331	751	2082	10.952	25.08	89524
Tomas	128.223.2.11	3Com [80:AC:82]	144	322	466	2.451	5.61	137544
Roman		HP [62:35:54]	0	154	154	0.810	1.86	0
Jonatan	207.108.87.11	Dlink [52:3B:B5]	0	424	424	2.230	5.11	0
Teo		Dlink [E5:0C:34]	0	132	132	0.694	1.59	0
BackupS	207.108.87.16	3Com [76:E1:CC]	578	419	997	5.245	12.01	714662
Sandy		3Com [8E:44:84]	159	135	294	1.547	3.54	9936
Ted	140.194.33.4	3Com [A4:04:58]	132	468	600	3.156	7.23	8312
Server5	207.108.87.9	3Com [C6:D8:65]	294	153	447	2.351	5.39	18576
Catie	207.108.87.21	Intel [08:1E:B5]	301	302	603	3.172	7.27	24086

Display Properties

Display properties can be set by right-clicking on the display or by clicking the Settings button. The **Settings** dialog offers configuration options for the components of the display.



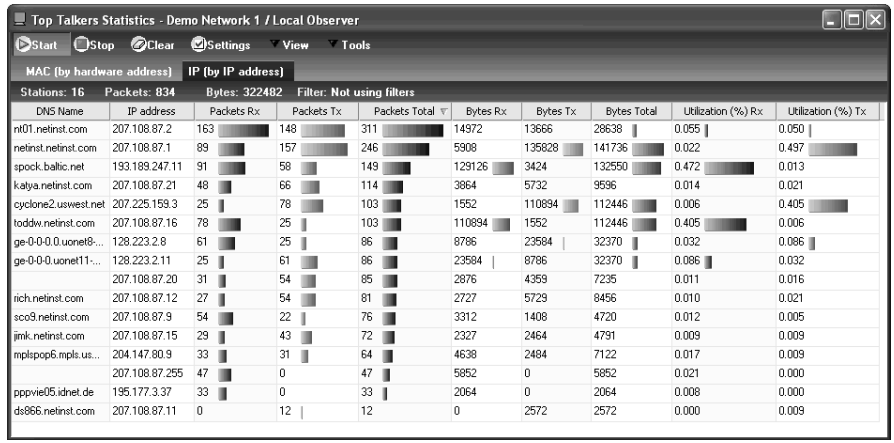
- “Item” dropdown—allows you to select which item will be configured.7
- “Item color” dropdown—allows you to select the color of the main display item.

Graph:

- “Bar height” spinbox—allows you to select the bar height.

IP Tab

The IP view offers a display of stations by IP address.



DNS Name	IP address	Packets Rx	Packets Tx	Packets Total	Bytes Rx	Bytes Tx	Bytes Total	Utilization (%) Rx	Utilization (%) Tx
nt01.netinst.com	207.108.87.2	163	148	311	14972	13666	28638	0.055	0.050
netinst.netinst.com	207.108.87.1	89	157	246	5908	135828	141736	0.022	0.497
spock.baltic.net	193.189.247.11	91	58	149	129126	3424	132550	0.472	0.013
katya.netinst.com	207.108.87.21	48	66	114	3864	5732	9596	0.014	0.021
cyclone2.uswest.net	207.225.159.3	25	78	103	1552	110894	112446	0.006	0.405
toddw.netinst.com	207.108.87.16	78	25	103	110894	1552	112446	0.405	0.006
ge-0-0-0.0.uonet8-...	128.223.2.8	61	25	86	8786	23584	32370	0.032	0.086
ge-0-0-0.uonet11-...	128.223.2.11	25	61	86	23584	8786	32370	0.086	0.032
	207.108.87.20	31	54	85	2876	4359	7235	0.011	0.016
rich.netinst.com	207.108.87.12	27	54	81	2727	5729	8456	0.010	0.021
sco9.netinst.com	207.108.87.9	54	22	76	3312	1408	4720	0.012	0.005
jimk.netinst.com	207.108.87.15	29	43	72	2327	2464	4791	0.009	0.009
mplspop6.mpls.us...	204.147.80.9	33	31	64	4638	2484	7122	0.017	0.009
	207.108.87.255	47	0	47	5852	0	5852	0.021	0.000
pppvie05.idnet.de	195.177.3.37	33	0	33	2064	0	2064	0.008	0.000
ds866.netinst.com	207.108.87.11	0	12	12	0	2572	2572	0.000	0.009

To begin collecting statistics, click the Settings button. The display shows Alias, IP address, and MAC address.

- The “%” field shows the percent of bandwidth utilization for that destination/source/total address.

  This is the percent of filtered bandwidth. If you would like to see the percent of total bandwidth that a particular address is using, you will need to set up an ANY_ADDRESS to and from ANY_ADDRESS filter, and no protocol filter.

- The “Packets” field shows the number of packets to (or from) the destination/source address, subject to the current filter set.
- The “Bytes” field shows the bytes to (or from) the destination/source address, subject to the current filter set.
- Packets and Bytes are also displayed as rated values (Pkts/sec and Bytes/sec).
- Broadcast and Multicast packet rates and numeric values are also displayed by station.

Display Settings

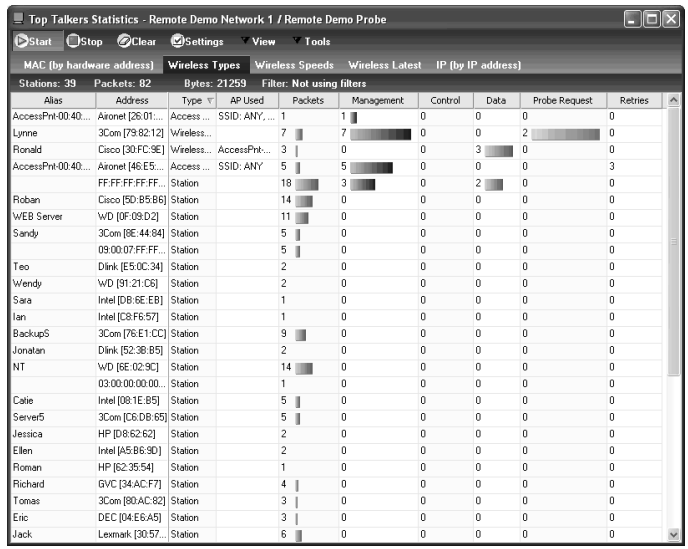
Display properties can be set by clicking the Settings button. The **3D Pie/Column chart** tab offers configuration options for the components of the display.

- “Item” dropdown—allows you to select which item will be configured.
- “Item color” dropdown—allows you to select the color of the main display item.

Graph:

- “Bar height” spinbox—allows you to select the bar height.

Wireless Types Tab (active for wireless analysis only)



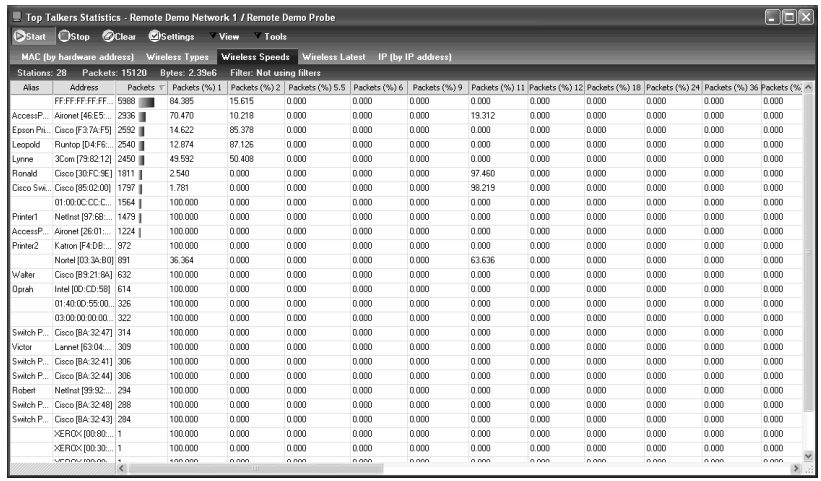
Alias	Address	Type	AP Used	Packets	Management	Control	Data	Probe Request	Retries
AccessPnt-00:40:...	Aironet [26:01:...	Access ...	SSID: ANY, ...	1	1	0	0	0	0
Lynne	3Com [79:82:12]	Wireless...		7	7	0	0	2	0
Ronald	Cisco [30:FC:9E]	Wireless...	AccessPnt-...	3	0	0	3	0	0
AccessPnt-00:40:...	Aironet [46:E5:...	Access ...	SSID: ANY	5	5	0	0	0	3
	FF:FF:FF:FF:FF:...	Station		18	3	0	2	0	0
Roban	Cisco [5D:B5:B6]	Station		14	0	0	0	0	0
WEB Server	WD [0F:09:D2]	Station		11	0	0	0	0	0
Sandy	3Com [8E:44:84]	Station		5	0	0	0	0	0
	09:00:07:FF:FF:...	Station		5	0	0	0	0	0
Teo	Dlink [E5:0C:34]	Station		2	0	0	0	0	0
Wendy	WD [91:21:C6]	Station		2	0	0	0	0	0
Sara	Intel [DB:6E:EB]	Station		1	0	0	0	0	0
Ian	Intel [C8:F6:57]	Station		1	0	0	0	0	0
BackupS	3Com [76:E1:CC]	Station		9	0	0	0	0	0
Jonatan	Dlink [52:3B:B5]	Station		2	0	0	0	0	0
NT	WD [6E:02:9C]	Station		14	0	0	0	0	0
	03:00:00:00:00:...	Station		1	0	0	0	0	0
Catie	Intel [08:1E:B5]	Station		5	0	0	0	0	0
Server5	3Com [C6:DB:65]	Station		5	0	0	0	0	0
Jessica	HP [D8:62:62]	Station		2	0	0	0	0	0
Ellen	Intel [A5:B6:9D]	Station		2	0	0	0	0	0
Roman	HP [62:35:54]	Station		1	0	0	0	0	0
Richard	GVC [34:AC:F7]	Station		4	0	0	0	0	0
Tomas	3Com [80:AC:82]	Station		3	0	0	0	0	0
Eric	DEC [04:E6:A5]	Station		3	0	0	0	0	0
Jack	Lexmark [30:57:...	Station		6	0	0	0	0	0

This display shows the type of each station sensed in the air: whether it is a network station talking over the air to wireless stations, a wireless station, or an AP. For stations, it shows which APs they are using. For APs, it displays the Service Set Identifier (SSID) and whether WEP is enabled on that AP. It also displays Control, Data and Management totals per station. As with other tabular displays in Observer, right-click on the column headings to configure the column view.

Statistic	**Description**
Alias	Alias of the Top Talker system, if one is available.
Address	Media Access Control (MAC) address, i.e., the “hardware address.”
Packets	The total number of packets sent by the system.
Management	The number of management packets sent by the system.
Control	The number of control packets sent by the system.
Data	The number of data packets sent by the system.
Probe Request	The number probe requests sent by the system.
Retries	The number of transmission retries sent by the system.
Type	The type of station: Wireless or Access Point

AP Used	The access point used by the system.

Wireless Speeds Tab (active for wireless analysis only)

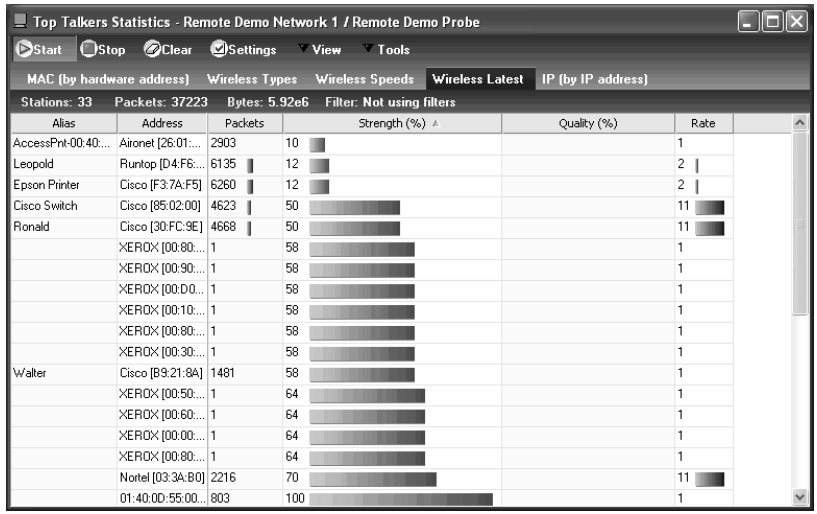


This tab shows signal strength, quality, the overall rate and data rate, as well as the packet distributions for different rates. As with all of the statistical displays in Observer, you can configure the mode to display only the statistics that you are currently interested in by right-clicking on the column headers.

Statistic	**Description**
Alias	Alias of the Top Talker system, if one is available.
Address	Media Access Control (MAC) address, i.e., the “hardware address.”
Packets	The total number of packets sent by the system.
Avg Strength (%)	The average signal strength, as a percentage of the optimum.
Avg Quality (%)	The average signal-to-noise ratio, as a percentage of the optimum.
Avg Data Rate	The rate of data packets on the wireless network.
Avg speed	The speed of all packets on the wireless network.
Util %	The percentage of bandwidth utilized.
Pkt 1	The number of packets captured at 1Mbit/sec.
Pkt 2	The number of packets captured at 2Mbit/sec.
Pkt 5.5	The number of packets captured at 5.5Mbit/sec.

Pkt 11	The number of packets captured at 11Mbit/sec.

Wireless Latest Tab (active for wireless analysis only)



This tab shows the strength, quality, and speed of the wireless network, as seen at the last poll, as opposed to the other Top Talker displays, which present running *averages*.

Utilization History Mode

Displays long-term bandwidth utilization data and allows that data to be exported.

Menu Path

Statistics->Utilization History

Purpose

Utilization History displays (and allows for export) longer term information about your bandwidth utilization. The graph shows high, low and average utilization over time—the amount of time is only limited by your computer's RAM. Sampling is still once a second, but the display can be configured to report at various time intervals.

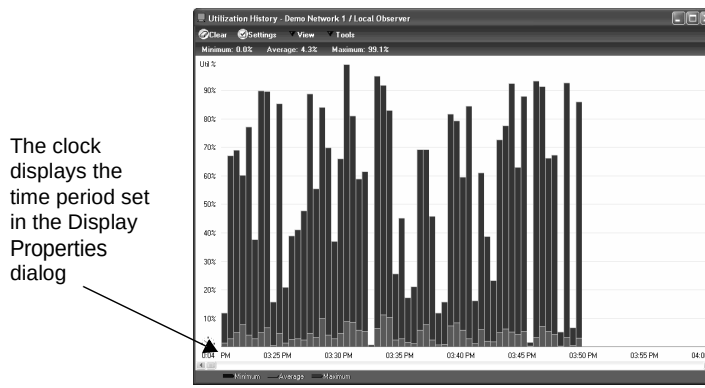
You cannot start or stop this mode. When the mode is displayed, it is automatically started. To stop the mode, simply close the mode window. The Utilization History display can be viewed in graph, dial, or list view. There is no setup dialog for Utilization History.

Once the Utilization History graph is displayed, it automatically begins capturing data. The display of the data will depend on how you have setup each item in the Display Properties dialog. There are three statistics that the display will keep track of: maximum, average, and minimum. Although data points are only shown for the time period set in the Display Properties dialog, data is collected and processed every second, and then averages the data over the configured time period (seconds/interval).

Available Views

- Graph View
- Dial View
- List View
- 3D Chart

Graph View

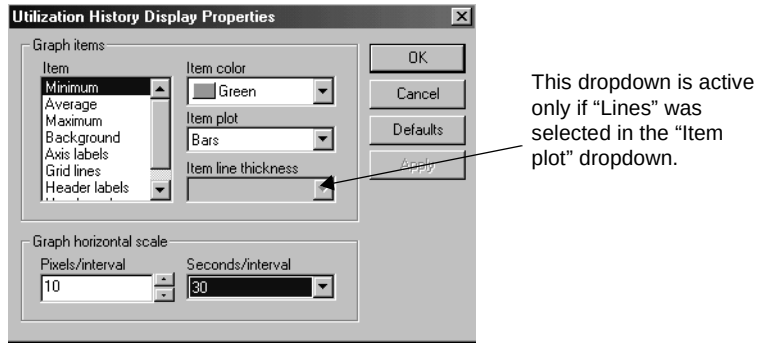


Things to keep in mind:

- While in graph mode, it is important to remember that the scroll bar at the bottom of the graph will allow you to see historical utilization data that was collected during the current session of Observer.
- You can save Utilization History data to a comma-delimited file by choosing File > Save Mode in Comma Delimited Format from Observer's Main menu.
- The Utilization History display can be cleared using the Clear button.

Display Properties

Display properties can be set by right-clicking on the display or by clicking the Settings button. The **Settings** dialog offers configuration options for the components of the display.



- “Item” dropdown—allows you to select which item will be configured.
- “Item color” dropdown—allows you to select the color of the main display item.
- “Item plot” dropdown—allows you to select the item to be displayed as lines or bars.
- “Item line thickness” dropdown—allows you to select the thickness of the line; this is only active if you have selected “Lines” from the “Item plot” dropdown.

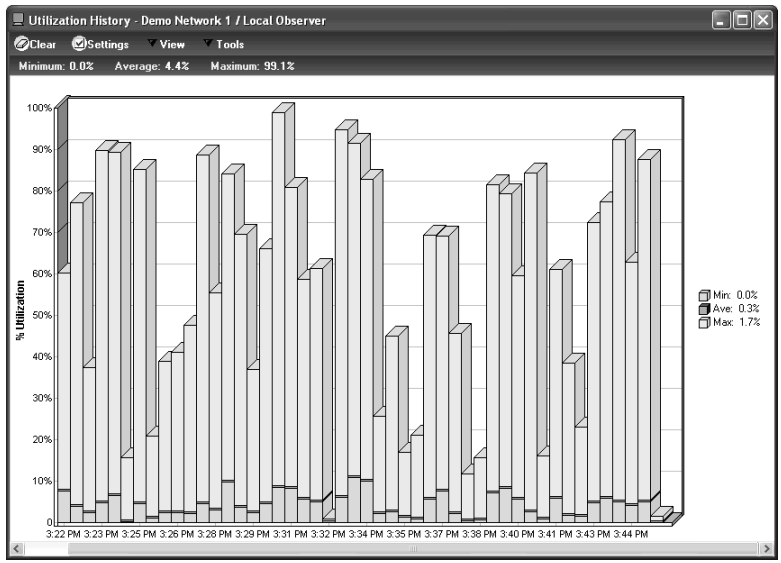
Graph horizontal scale:

- “Pixels/interval” spinbox—allows you to select how many pixels each interval display will occupy.
- “Seconds/interval” dropdown—allows you to set the number of seconds Observer will average before displaying interval information.

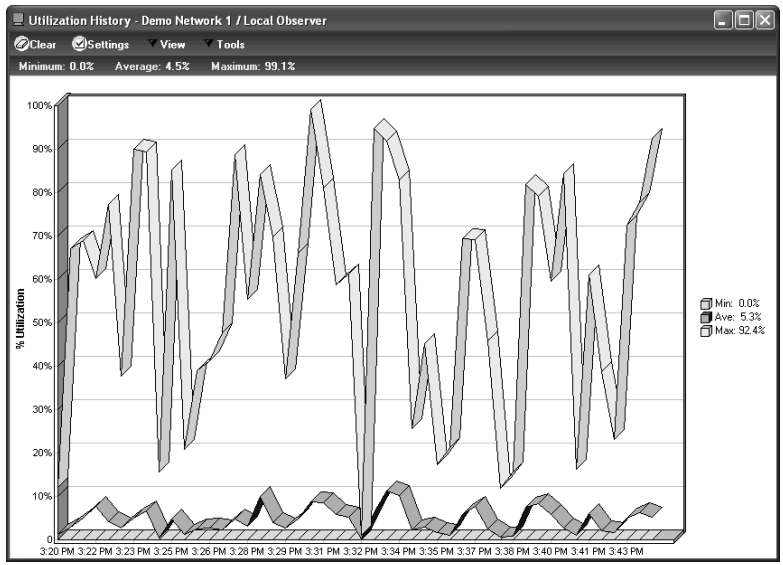
Right-Click Menu

Right-clicking on the graph will display the **Display Properties** dialog for Utilization History – Graph View.

3D Column Chart View

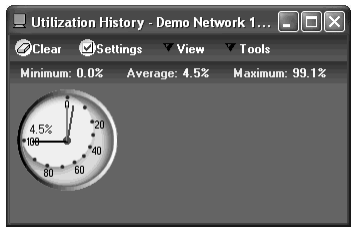


3D Line Chart View



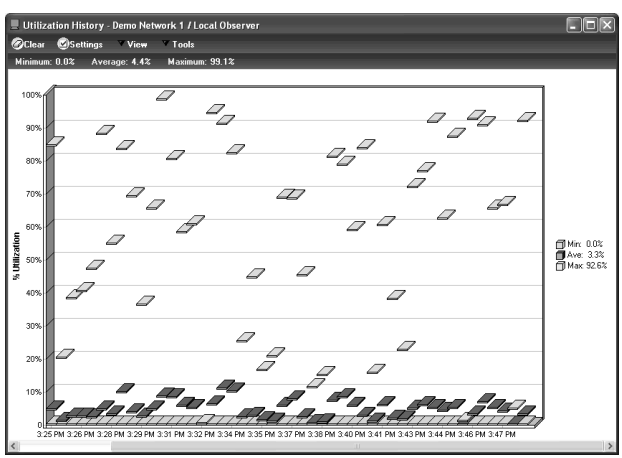
Dial View

The dial view of Utilization History provides a view of longer term information about your bandwidth utilization. The dial shows high, low, and average utilization over time.



Utilization Summary View

3D Step Chart View

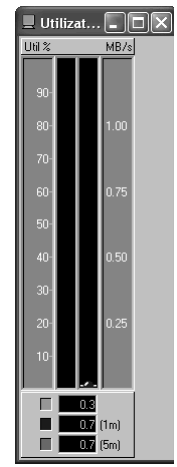


Utilization Thermometer Mode

The Utilization Thermometer displays the current network bandwidth utilization as a percentage of the total theoretical network speed. Additionally, the thermometer shows a running one minute and five minute average. These averages are shown on the right of the bandwidth scale as round blue (1 minute) and red (5 minute) balls.

Utilization Thermometer can be activated from the main window by selecting Statistics > Utilization Thermometer.

There are no configuration options for the Utilization Thermometer.



Web Observer

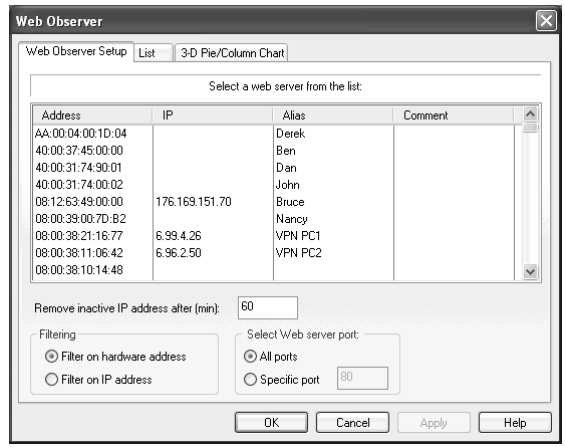
This mode was designed to view a Web server from the standpoint of the traffic flow into and out of the device. In this mode, Observer focuses on all port 80 (the default for Web traffic) or all port traffic going in and out of the specified device.

> Web Observer mode can also be used to evaluate the port 80 (or all traffic) usage of any station with an IP address, even if it isn't a server.

Web Observer is available in graph and list views.

Setup Properties

To use Web Observer you will need to first configure the mode. This is done by clicking the icon, which will then display the **Web Observer Setup** dialog.



- "Select a web server from the list" dropdown—allows you to select the server's IP address, including alias and comment.
- "Remove inactive IP address after (min)" textbox—allows you to set how long to keep IP addresses on the table before assuming they are inactive.

Filtering:

- Filter on hardware address option button
- Filter on IP address option button

Select Web server port:

- All ports option button—allows you to select all ports (i.e., all IP traffic).
- Specific port option button and textbox—allows you to enter a specific port (the default is 80). The textbox will be enabled when you select the Specific port option button.

Available Views

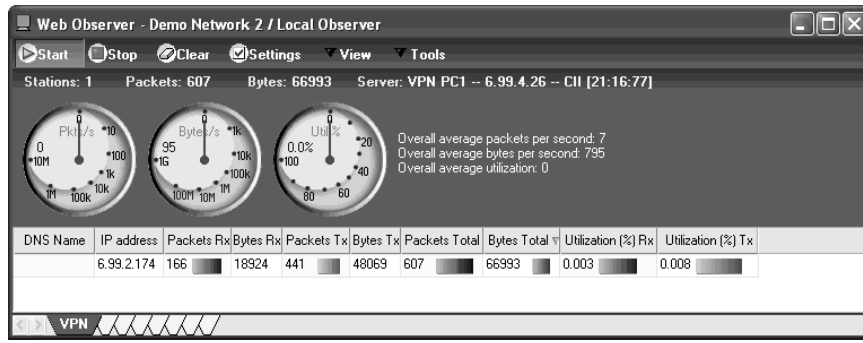
- List View
- 3D Chart and Pie Views

All views except List View include heads-up server address and response time dial meters.

List View

The Web Observer mode can be activated from the main window by selecting Statistics > Web Observer.

The main display shows the Web server address. Should the server go down, the dial display turns into a broken connection display.



The Web Observer display items include:

- Stations—displays the number of stations that have exchanged traffic with the selected server during the time that Web Observer has been running, minus those stations whose IP addresses have been removed from the table, as configured above.
- Packets—displays the total number of packets transmitted and received by the selected server during the time that Web Observer has been running.
- Bytes—displays the total number of bytes transmitted and received by the station during the time that Web Observer has been running.
- Server—displays the name, IP address, and MAC address of the specified server.
- Overall average packets per second—displays the average packets per second.
- Overall average bytes per second—displays the average bytes per second.
- Overall average utilization—displays the average utilization.

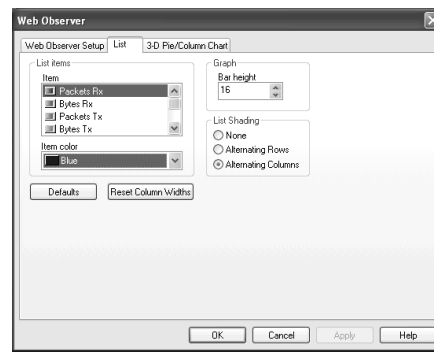
On the bottom pane display, Observer lists the current IP addresses that are communicating with the specified Web server with the following information:

- DNS Name—displays the name given to the listed station in Discover Network Names mode.
- IP address—displays the IP address of the listed station.
- In packets—displays the number of packets sent to the listed station from the specified Web server.

- In bytes—displays the number of bytes sent from the listed station to the specified Web server.
- Out packets—displays the number of packets sent to the listed station from the specified Web server.
- Out bytes—displays the number of bytes sent from the listed station to the specified Web server.
- Total packets—displays the total number of packets sent between the listed station and the specified Web server.
- Total bytes—displays the total number of bytes sent between the listed station and the specified Web server.
- In % util.—displays the total utilization received between the listed station from the specified Web server.
- Out % util.—displays the total utilization transmitted to the listed station from the specified Web server.

Display Properties

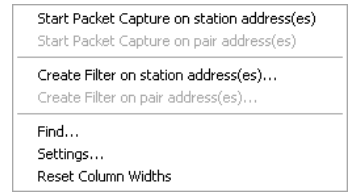
Display properties can be set by right-clicking on the display or by clicking the icon. The **Display Properties** dialog offers configuration options for the components of the display.



- "Item" dropdown—allows you to select the look of the information presented in the view.
- "Item color" dropdown—allows you to select the color of the item listed in the "Item" list box.

Graph:

- "Bar height" spinbox—allows you to configure the bar height in pixels.



- Start Packet Capture on station address(es)—activates the Filters dialog.
- Start Packet Capture on pair address(es)—activates the Filters dialog.
- Create Filter on station address(es)—activates the Filters dialog.
- Create Filter on pair address(es)—activates the Filters dialog.
- Find—displays the Find dialog.
- Setup—displays the Setup Properties dialog.
- Display Properties—displays the Display Properties dialog.

Wireless Access Point Statistics

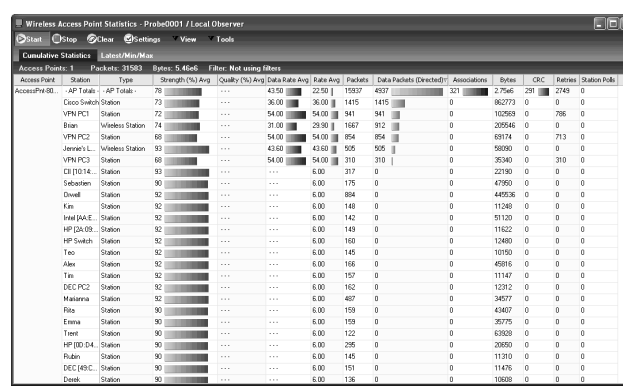
Shows traffic passing through wireless Access Points (APs). Available only if a Network Instruments wireless driver is installed with one of the supported wireless cards.

Menu Path

Statistics->Access Point Statistics

Purpose

The Access Point Statistics mode shows traffic passing through any Access Points (APs) visible to the Observer wireless NIC.



This mode is an all-purpose tool for maintaining performance and security on a WLAN that uses APs, showing you:

- Wireless stations that are connected to an AP
- Non-wired stations that they communicate with
- Levels of signal strength, quality, data transfer rates, and non-data transfer rates on each station on the access point
- AP traffic totals

For example, you can immediately see if there is a station connected to the wrong AP, or if an unauthorized AP has been installed. AP statistics will display whether a station has a problem with quality or range of connection based on the number of reassociations and retransmissions, or whether a station is misconfigured based on station poll totals.

There are two Access Point Statistics tabs. The **Cumulative** tab shows running totals of statistics collected since the mode was started; the **Latest/Min/Max** tab shows the most recent, the minimum, and the maximum values for access point statistics.

The following table describes each statistic shown in List and Graph view.

> Note that some columns are turned off by default; right click on the column heading to set which statistics you want to display.

- Access Point—The MAC address of the Access Point for this row of statistics.
- Station—The MAC address or alias of the station communicating with the AP. To switch between showing aliases and MAC addresses, press the Setup button to the left of the display.

The following statistics are available on the **Cumulative** tab.

- Type—The type of device connected to the AP: a wireless station, a station (unwired), or another Access Point.
- Avg Strength (%)—The average strength of the signal, expressed as a percentage of the optimum strength.
- Avg Quality (%)—The average signal-to-noise ratio of the signal, expressed as a percentage of the optimum.
- Avg Data Rate—The average rate of data packets on the wireless network.
- Avg Rate—The average rate of all packets (data+control+management+beacon) on the wireless network.
- Packets—The total number of packets seen.
- Data pkts (Directed)—The total number of data packets seen.

- Associations—The number of associations (connection sessions) that have been established with this AP.
- Bytes—The total number of bytes seen.
- CRC—The total number of CRC errors reported by the AP.
- Retries—The total number of transmission retries reported by the AP.
- Station Polls—The total number of poll requests by station; a high number means that a station cannot connect to an AP. In the 802.11b protocol, a station first polls for an AP, then associates with a responding AP.

The following statistics are available on the **Latest/Min/Max** tab.

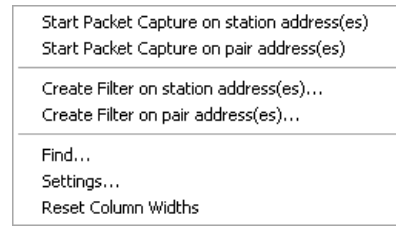
- Latest Strength—The strength of the signal seen at the last poll.
- Min Strength—The lowest strength signal seen, expressed as a percentage of the optimum.
- Max Strength—The highest strength signal seen, expressed as a percentage of the optimum.
- Latest Quality—The quality of the signal as seen at the last poll.
- Min Quality—The poorest quality signal seen, expressed as a percentage of the optimum.
- Max Quality—The best quality signal seen, expressed as a percentage of the optimum.
- Latest Data Rate—The data rate seen at the last poll.
- Min Data Rate—The slowest data rate seen, expressed in Mbits/sec.
- Max Data Rate—The fastest data rate seen, expressed in Mbits/sec.
- Latest Rate—The rate of total packet throughput seen at the last poll.
- Min Rate—The slowest rate of total packet throughput seen, expressed in Mbits/sec.
- Max Rate—The fastest rate of total packet throughput seen, expressed in Mbits/sec.

Setup and Display Properties

To change the bar height, color, and whether to display aliases or MAC addresses by clicking the Display Properties icon to the left of the list or graph view. You can also change the display properties for 3D charts and pie charts by clicking the Display Properties icon to the left of the 3D Chart or Pie view.

Right-click Menu

In Graph and List views, you can create a filter or start a packet capture on any listed station or AP. You can also search for stations, APs, or MAC address by choosing **Find...**



Wireless Site Survey

Scans selected wireless channels, displaying detailed activity on the WLAN by channel.

Menu Path

Statistics->Wireless Site Survey (only available when a supported wireless card and driver are installed.)

Purpose

The Wireless Site Survey displays activity by channels on your wireless network. Its eight tabs show detailed statistical counts, letting you limit the display to Transmit (TX) and Receive (RX) where appropriate.

Two things to note about the Site Survey:

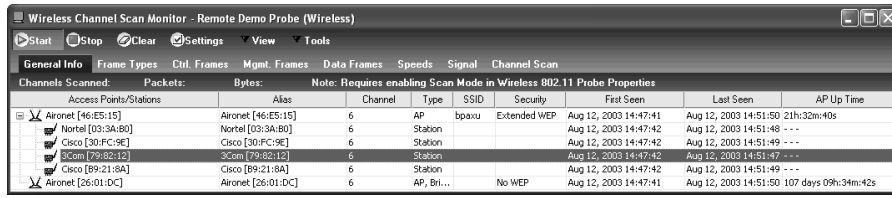
- You must set the channels to scan in the Probe or Device Properties dialog, 802.11a/b Settings. See “Wireless 802.11a/b Tab” on page 261.
- When Observer is scanning channels, the other modes (such as Top Talkers, Access Point Statistics) will no longer be able to present complete view of the network, as Observer’s data sample is limited to the current channel being scanned. Therefore, you should only use the Site Survey by itself.

The tabs and the information on them is described in the following sections.

> Note that some fields are hidden by default; to reconfigure the display, right-click on the statistics column heading.

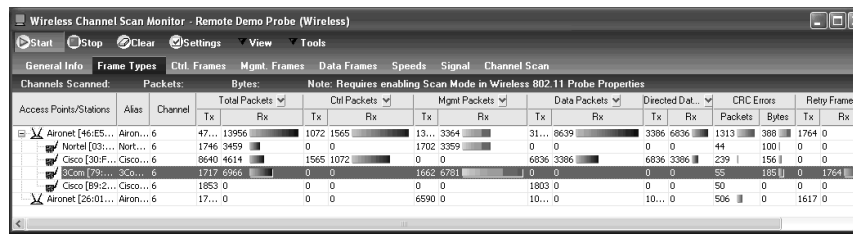
General Information Tab

This table summarizes essential information about what access points and stations are currently visible to wireless Observer:



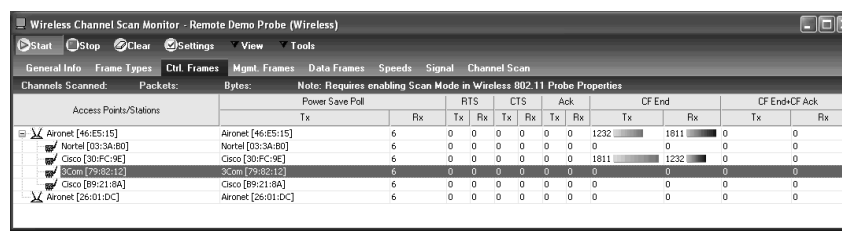
Frame Type Tab

This table summarizes frame type totals for wireless data, management, and control packets:



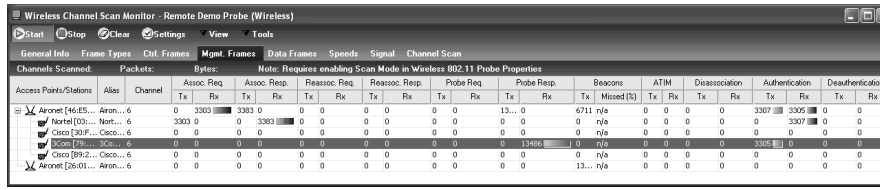
Control Frames Tab

This table details control frames analyzed, including Power Save Polls, Requests to Send (RTS), Clear to Send (CTS), acknowledge (ACK), and CF (Contention Free) End packets.



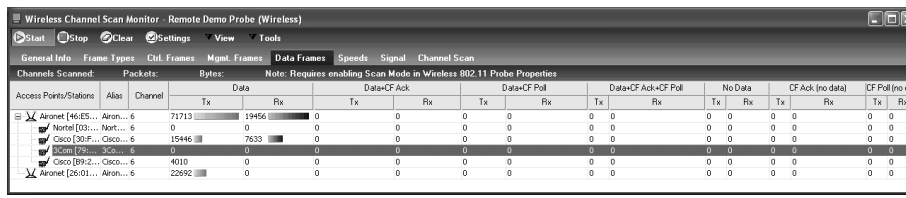
Management Frames Tab

Displays detailed information about wireless management frames, including association requests and responses, reassociation requests and responses, ATIMs (Announcement Traffic Indication Message), and authentication/deauthentications.



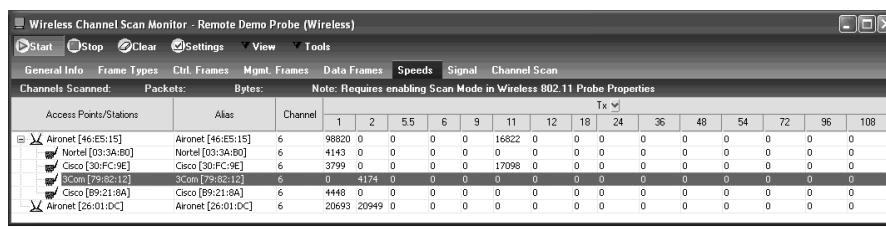
Data Frames Tab

Displays detailed information about data frames on the wireless network.



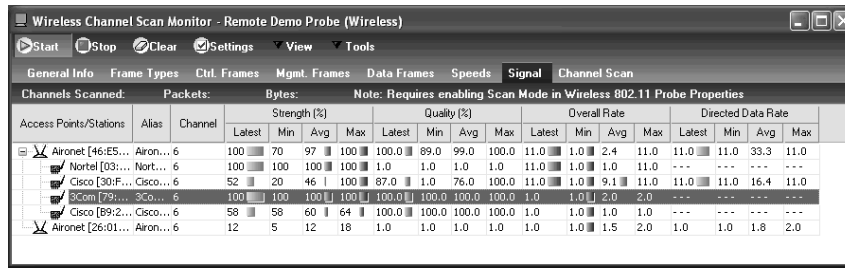
Speeds Tab

Shows what stations are either transmitting (or receiving) wireless data at the various supported rates. To switch between transmitting and receiving speeds, click the down arrow next the Tx (or Rx) and select the desired setting.

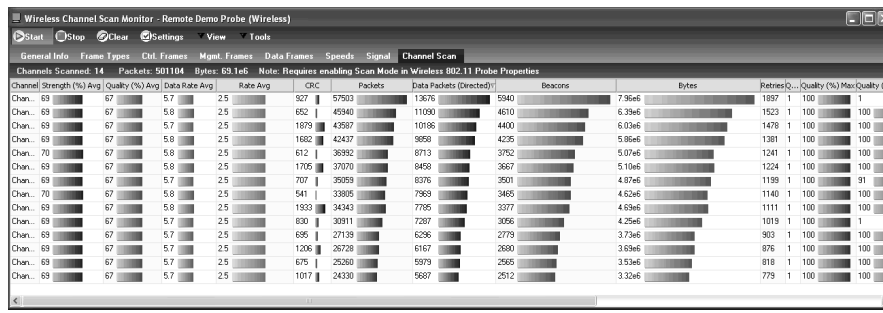


Signal Tab

Displays detailed statistics on wireless signal strength and quality, as well as data rates being used by stations and APs.



Channel Scan Tab



- Channel—Channel being tracked in this row of data.
- Avg Strength (%)—The average strength of the signal, expressed as a percentage of the optimum strength.
- Avg Quality (%)—The average signal-to-noise ratio of the signal, expressed as a percentage of the optimum.
- Avg Data Rate—The rate of data packets on the wireless network.
- Avg Rate—The rate of all packets (data+control+management+beacon) on the wireless network.
- CRC—Total number of CRC errors reported on this channel.
- Packets—Total number of packets (data+control+management+beacon) seen.
- Data pkts (directed)—Total number of data packets (packets with a payload and an address) seen.
- Beacons—Total number of beacons seen.
- Bytes—Total number of bytes seen.

- Retries—Total number of retries reported on this channel.
- Min Quality—The poorest quality signal seen, expressed as a percentage of the optimum.
- Max Quality—The best quality signal seen, expressed as a percentage of the optimum.
- Latest Quality—The quality of the signal as seen at the last poll.
- Min Strength—The lowest strength signal seen, expressed as a percentage of the optimum.
- Max Strength—The highest strength signal seen, expressed as a percentage of the optimum.
- Latest Strength—The strength of the signal seen at the last poll.
- Min Data Rate—The slowest data rate seen, expressed in Mbits/sec.
- Max Data Rate—The fastest data rate seen, expressed in Mbits/sec.
- Latest Data Rate—The data rate seen at the last poll.
- Min Rate—The slowest rate of total throughput seen, expressed in Mbits/sec.
- Max Rate—The fastest rate of total packet throughput seen, expressed in Mbits/sec.
- Latest Rate—The rate of total packet throughput seen at the last poll.

Triggers and Alarms Mode

Lets you set triggers in response to particular network conditions, and define actions to occur when the conditions are met.

Menu Path

Statistics->Triggers and Alarms

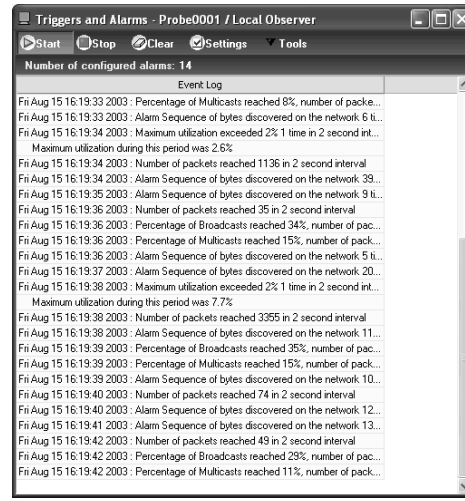
Purpose

Observer's Triggers and Alarms mode allows you to set a trigger for a particular network activity (using presets or defining your own) and to associate an action condition when the triggered condition is present. Multiple triggers can be set and run concurrently.

Actions can be pop-up windows, printed trouble tickets, or appended information to an event log. Triggers can also be set to execute a user-defined program—such as an email package or paging software.

Triggers and Alarms is available in List View.

Start the Triggers and Alarms mode by clicking the Start button.

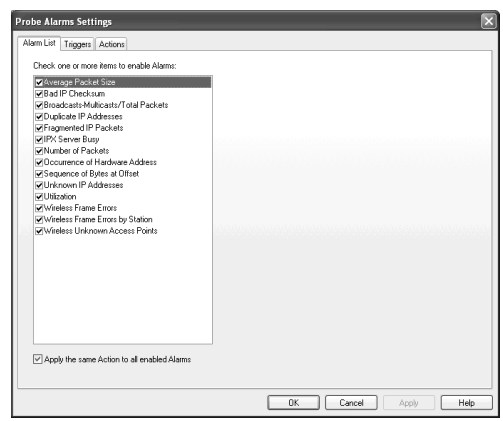

Triggers and Alarms - Probe0001 / Local Observer
Start
Stop
Clear
Settings
Tools
Number of configured alarms: 14
Event Log
Fri Aug 15 16:19:33 2003 : Percentage of Multicasts reached 8%, number of packe...
Fri Aug 15 16:19:33 2003 : Alarm Sequence of bytes discovered on the network 6 ti...
Fri Aug 15 16:19:34 2003 : Maximum utilization exceeded 2% 1 time in 2 second int...
Maximum utilization during this period was 2.6%
Fri Aug 15 16:19:34 2003 : Number of packets reached 1136 in 2 second interval
Fri Aug 15 16:19:34 2003 : Alarm Sequence of bytes discovered on the network 39...
Fri Aug 15 16:19:35 2003 : Alarm Sequence of bytes discovered on the network 9 ti...
Fri Aug 15 16:19:36 2003 : Number of packets reached 35 in 2 second interval
Fri Aug 15 16:19:36 2003 : Percentage of Broadcasts reached 34%, number of pac...
Fri Aug 15 16:19:36 2003 : Percentage of Multicasts reached 15%, number of pack...
Fri Aug 15 16:19:36 2003 : Alarm Sequence of bytes discovered on the network 5 ti...
Fri Aug 15 16:19:37 2003 : Alarm Sequence of bytes discovered on the network 20...
Fri Aug 15 16:19:38 2003 : Maximum utilization exceeded 2% 1 time in 2 second int...
Maximum utilization during this period was 7.7%
Fri Aug 15 16:19:38 2003 : Number of packets reached 3355 in 2 second interval
Fri Aug 15 16:19:38 2003 : Alarm Sequence of bytes discovered on the network 11...
Fri Aug 15 16:19:39 2003 : Percentage of Broadcasts reached 35%, number of pac...
Fri Aug 15 16:19:39 2003 : Percentage of Multicasts reached 15%, number of pack...
Fri Aug 15 16:19:39 2003 : Alarm Sequence of bytes discovered on the network 10...
Fri Aug 15 16:19:40 2003 : Number of packets reached 74 in 2 second interval
Fri Aug 15 16:19:40 2003 : Alarm Sequence of bytes discovered on the network 12...
Fri Aug 15 16:19:41 2003 : Alarm Sequence of bytes discovered on the network 13...
Fri Aug 15 16:19:42 2003 : Number of packets reached 49 in 2 second interval
Fri Aug 15 16:19:42 2003 : Percentage of Broadcasts reached 29%, number of pac...
Fri Aug 15 16:19:42 2003 : Percentage of Multicasts reached 11%, number of pack...

The initial Triggers and Alarms display shows the event log and the current trigger and alarm settings (the number of configured triggers).

The Event Log can be saved by selecting File > Save Mode in Comma Delimited Format from Observer's main menu. The event log can also be cleared by clicking the CLEAR icon.

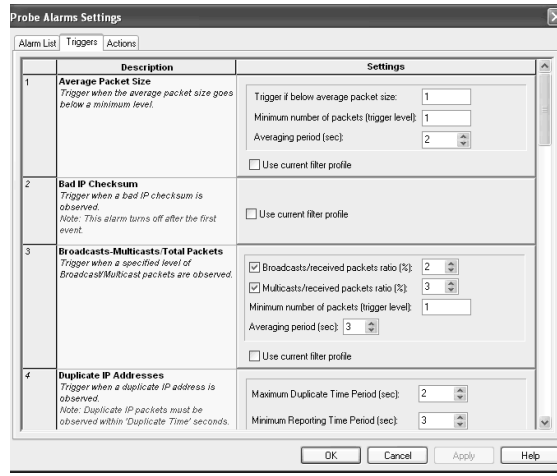
Configuring Triggers and Alarms

1. Configuring Triggers and Alarms is done through a series of dialogs accessed by first clicking the **Settings** button from the main Triggers and Alarms display.



2. Check one, many, or all of the items to enable alarms.

3. Once you have set which alarms you would like to activate, select the “Triggers” tab to configure the specific Alarm options.


Probe Alarms Settings
Alarm List
Triggers
Actions
Description
Settings
1
Average Packet Size
Trigger when the average packet size goes below a minimum level.
Trigger if below average packet size: 1
Minimum number of packets (trigger level): 1
Averaging period (sec): 2
Use current filter profile
2
Bad IP Checksum
Trigger when a bad IP checksum is observed.
Note: This alarm turns off after the first event.
Use current filter profile
3
Broadcasts-Multicasts/Total Packets
Trigger when a specified level of Broadcast/Multicast packets are observed.
Broadcasts/received packets ratio (%): 2
Multicasts/received packets ratio (%): 3
Minimum number of packets (trigger level): 1
Averaging period (sec): 3
Use current filter profile
4
Duplicate IP Addresses
Trigger when a duplicate IP address is observed.
Note: Duplicate IP packets must be observed within 'Duplicate Time' seconds.
Maximum Duplicate Time Period (sec): 2
Minimum Reporting Time Period (sec): 3
OK
Cancel
Apply
Help

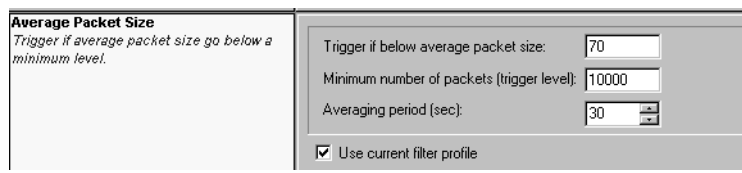
4. A separate action can be defined for each alarm or a single action can be set for all alarms. The checkbox on the “Alarm List” tab defines which trigger setting options will be displayed on the “Triggers” tab. see “Trigger Settings” on page 150.

5. Click on the “Actions” tab to display the **Actions Settings** dialog. see “Fragmented IP Packets” on page 153.

Trigger Settings

Average Packet Size

This trigger is used to identify average packet sizes below a certain size over a period of time.


Average Packet Size
Trigger if average packet size go below a minimum level.
Trigger if below average packet size: 70
Minimum number of packets (trigger level): 10000
Averaging period (sec): 30
Use current filter profile

- “Trigger if below average packet size” textbox—allows you to set the size, in bytes, of the minimum packet size to monitor.
- “Minimum number of packets (trigger level)” textbox—allows you to set the smallest number of packets in the averaging period that will be provided as data for the trigger. For example, if you set the minimum number of packets to 1000 and the averaging period to 10 seconds, then if less than 1000 packets are seen in

the ten second time period, this 10 second time period is not considered as data for this trigger.

This value ensures that the trigger will not be activated during a slow period of network activity when a particular device or station is broadcasting.

- "Averaging period" spinbox—allows you to set the amount of time, in seconds, that data will be collected and averaged before a value is considered for the trigger. Sampling is every second. Values for the averaging period can be from 1 to 100 (seconds).
- "Use current filter profile" checkbox—when selected, allows you to use the current protocol filter.

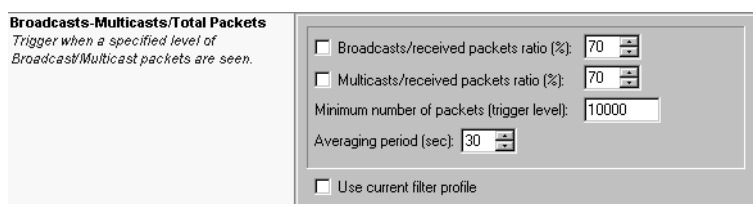
Bad IP Checksum

This trigger activates if a bad IP checksum is encountered. This usually indicates a bad network adapter or bad cabling and is a common cause of unexplained network slowdowns.

- "Use current filter profile" checkbox—when selected, allows you to use the current protocol filter.

Broadcasts-Multicasts/Total Packets

This trigger activates when the ratio of broadcasts and/or multicasts is above a certain user-specified level. This trigger is typically used to warn of broadcast/multicast storms.


Broadcasts-Multicasts/Total Packets
Trigger when a specified level of Broadcast/Multicast packets are seen.
Broadcasts/received packets ratio (%): 70
Multicasts/received packets ratio (%): 70
Minimum number of packets (trigger level): 10000
Averaging period (sec): 30
Use current filter profile

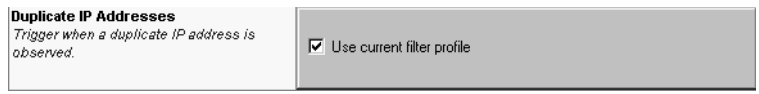
- "Broadcasts/received packets ratio (%)" checkbox and spinbox—allows you to set the ratio as a percentage of broadcasts to received packets.
- "Multicasts/received packets ratio (%)" checkbox and spinbox—allows you to set the ratio as a percentage of multicasts to received packets.
- "Minimum number of packets (trigger level)" textbox—this is the smallest number of packets in an averaging period that will be provided as data for the trigger. For example, if you set the minimum number of packets to 1000 and the averaging period to 10 seconds, then if less than 1000 packets are seen in the ten second time period, this 10 second time period is not considered as data for the trigger.

This value ensures that the trigger will not be activated during a slow period of network activity when a particular device or station is broadcasting.

- “Averaging period (sec)” spinbox—the amount of time in seconds that data will be collected and averaged before a value is considered for the trigger. Sampling is every second. Values for the averaging period can be from 1 to 100 (seconds).
- “Use current filter profile” checkbox—when selected, allows you to use the current protocol filter.

Duplicate IP Addresses

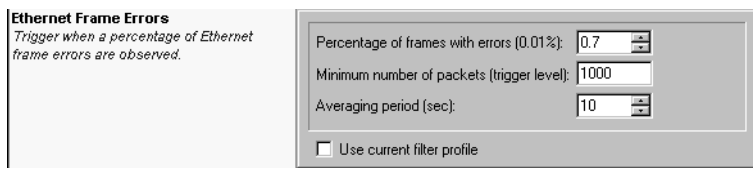
This trigger activates when two IP addresses that are identical, from different hardware devices, are seen on your network.



- “Use current filter profile” checkbox—when selected, allows you to use the current protocol filter.

Ethernet Frame Errors

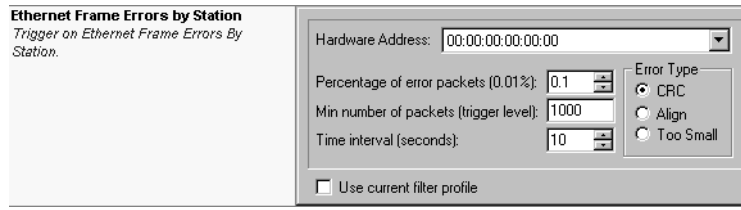
This trigger activates when a percentage of Ethernet frame errors are observed.


Ethernet Frame Errors
Trigger when a percentage of Ethernet frame errors are observed.
Percentage of frames with errors (0.01%): 0.7
Minimum number of packets (trigger level): 1000
Averaging period (sec): 10
Use current filter profile

- “Percentage of frames with errors (0.01%)” spinbox—allows you to set the percentage of frames, within the limits of the number of packets collected and the averaging period, that will set off the trigger.
- “Minimum number of packets (trigger level)” textbox—allows you to set the minimum number of packets collected before considering the data as a trigger condition. This is set to ensure that a low network activity state does not trigger an error alarm that is statistically meaningless.
- “Averaging period (sec)” spinbox—allows you to set the amount of time in seconds that data will be collected and averaged before a value is considered for the trigger. Sampling is every second. Values can be from 1 to 100 (seconds).
- “Use current filter profile” checkbox—when selected, allows you to use the current protocol filter.

Ethernet Frame Errors by Station

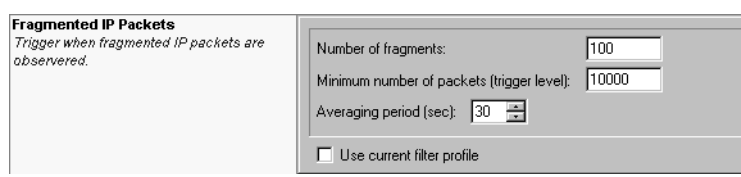
This trigger activates when there is an Ethernet frame error by station observed.



- "Hardware Address" dropdown—allows you to select the hardware address (station) that you want to trigger on. These addresses are read from the address table (see Filters section).
- "Percentage of error packets (0.01%)" spinbox—allows you to define the percent of errors you want to trigger on.
- "Min number of packets (trigger level)" textbox—allows you to define the minimum number of packets you want Observer to examine prior to considering the condition a triggerable event. This allows you to avoid low traffic situations where the percent of error packets may be quite high, but the total traffic to/from that station is so low that, in essence, it is an idle period.
- "Time interval (seconds)" spinbox—allows you to set how long the trigger will look at traffic and calculate the above conditions before resetting and starting over.
- "Error Type" option buttons—allows you to select the type of error you want Observer to trigger on: CRC, Align, or Too Small.
- "Use current filter profile" checkbox—when selected, allows you to use the current protocol filter.

Fragmented IP Packets

This trigger allows you to find fragmented IP packets and is used to find TCP/IP devices that are not optimally configured (e.g., routers with MTUs that are set too small) and devices that may be down (or are about to go down).



- "Number of fragments" textbox—allows you to set the number of fragmented packets which activate the trigger.
- "Minimum number of packets (trigger level)" textbox—allows you to set the smallest number of packets in an averaging period that will be provided as data for

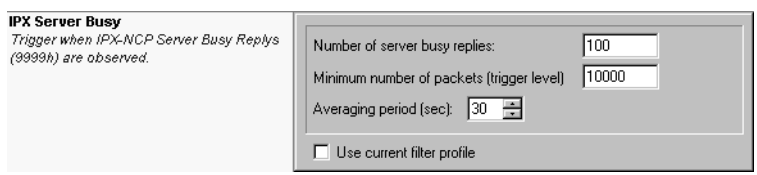
the trigger. For example, if you set the minimum number of packets to 1000 and the averaging period to 10 seconds, then if less than 1000 packets are seen in the ten second time period, this 10 second time period is not considered as data for the trigger.

This value ensures that the trigger will not be activated during a slow period of network activity when a particular device or station may be sending only a few fragmented packets, but they constitute a high percentage of the total.

- "Averaging period (sec)" spinbox—allows you to set the amount of time, in seconds, that data will be collected and averaged before a value is considered for the trigger. Sampling is every second. Values can be from 1 to 100 (seconds).
- "Use current filter profile" checkbox—when selected, allows you to use the current protocol filter.

IPX Server Busy

This trigger is activated when Observer sees a 9999 NCP (server busy) packet. This is one of the first things to check when looking for NetWare slowdowns.



- "Number of server busy replies" textbox—allows you to set the number of NCP 9999 packets received in an averaging time period.
- "Minimum number of packets (trigger level)" textbox—allows you to set the smallest number of 9999 NCP packets in the averaging period that will be provided as data for the trigger. For example, if you set the minimum number of packets to 1000 and the averaging period to 10 seconds, then if less than 1000 packets total are seen in the ten second time period, this 10 second time period is not considered as data for the trigger.

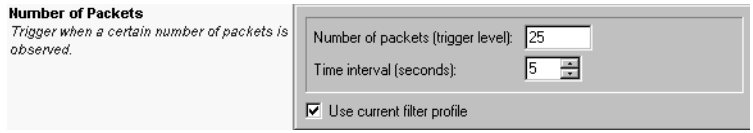
This value ensures that the trigger will not be activated during a slow period of network activity where a NetWare server may be sending only a few 9999 packets, but they constitute a high percentage of the total. This situation would be unusual, but you may want to deliberately set the minimum number of packets to a low threshold to see if server busy is still showing. If so, the server is not network load bound, but has an internal limitation that is slowing down its response to external requests.

- "Averaging period (sec)" spinbox—allows you to set the amount of time, in seconds, that data will be collected and averaged before a value is considered for the trigger. Sampling is every second. Values can be from 1 to 100 (seconds).

- “Use current filter profile” checkbox—when selected, allows you to use the current protocol filter.

Number of Packets

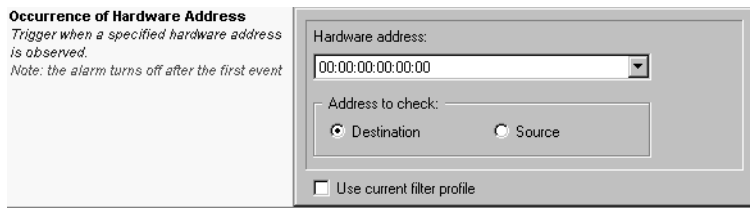
This trigger is for the number of packets per time period. Typically, it is used to calculate the packets/second for a particular device (e.g., router or bridge).



- “Number of packets (trigger level)” textbox—allows you to set the actual number of packets that are sent/received with respect to your current filter. For example, if you have a router or bridge that is rated at a particular packets/second throughput, you could set a trigger to let you know if that device is being asked to service more traffic than it is rated for. To do this, you would first set a filter to see packets that are going and coming from the device. Then, you would set the number of packets per second that the device is rated at in this dialog. Running this trigger will let you know if and when the device is being overrun and whether it is a source of network slowdowns.
- “Time interval (seconds)” spinbox—allows you to set how long the trigger will look at traffic and calculate the above conditions before resetting and starting over.
- “Use current filter profile” checkbox—when selected, allows you to use the current protocol filter.

Occurrence of Hardware Address

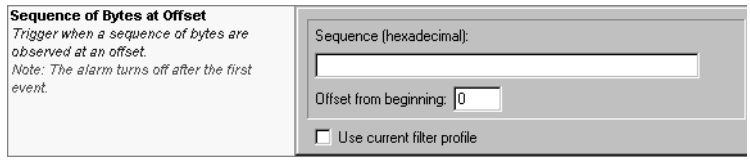
This trigger allows you to set when the occurrence of a specified hardware address is observed.



- “Hardware address” dropdown—allows you to select the hardware address.
- “Address to check” option buttons—allows you to choose from Destination or Source.
- “Use current protocol filter” checkbox—when selected, allows you to use the current protocol filter.

Sequence of Bytes at Offset

This trigger allows you to set a trigger on a user-defined event.


Sequence of Bytes at Offset
Trigger when a sequence of bytes are observed at an offset.
Note: The alarm turns off after the first event.
Sequence (hexadecimal):
Offset from beginning: 0
Use current filter profile

- "Sequence (hexadecimal)" textbox—allows you to set the actual packet information to look for. This is entered as hexadecimal codes. This sequence is non-byte swapped (i.e., network byte order). For example, if you define an offset-sequencing trigger to look for telnet packets (i.e., looking for TCP port 23), the offset would be 34 (14 bytes of Ethernet header + 20 more bytes of IP header) and the sequence would be 00 17 (23 in hex).

See the section on active highlighting (in the Packet View sections of the manual) for help on creating offsets. You can enter a specific offset from a packet's beginning and specific information to look for after that offset.

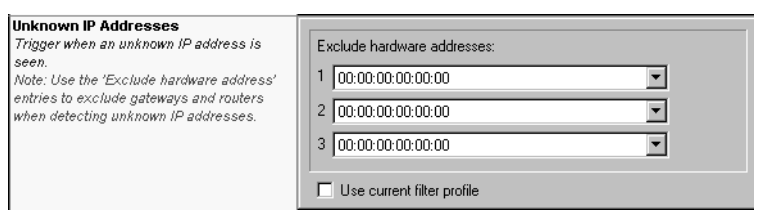
- "Offset from beginning" textbox—allows you to set the decimal position to start looking for the sequence.
- "Use current protocol filter" checkbox—when selected, allows you to use the current protocol filter.

Unknown IP Addresses

This trigger is designed to have Observer scan all packets and locate an unknown IP address. This is useful if you have users who may inadvertently (or not) change their IP address; thus, causing problems with any IP address strategy.

To use this trigger, you must have a "hosts" file in the Observer installation directory. This host file should have all known IP addresses listed. Observer will compare all newly found IP addresses to the addresses in the hosts file, and if a new address is found, Observer will trigger the associated action.

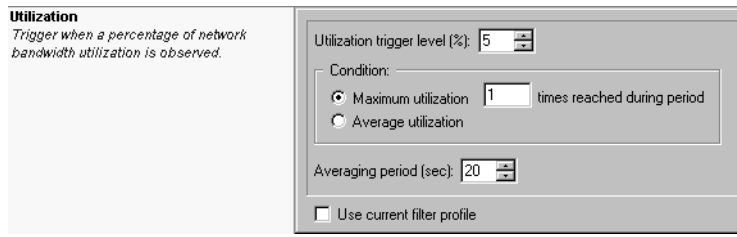
Configuration includes the exclusion of up to three hardware addresses (usually routers).


Unknown IP Addresses
Trigger when an unknown IP address is seen.
Note: Use the 'Exclude hardware address' entries to exclude gateways and routers when detecting unknown IP addresses.
Exclude hardware addresses:
1 00:00:00:00:00:00
2 00:00:00:00:00:00
3 00:00:00:00:00:00
Use current filter profile

- “Exclude hardware addresses” combo box—allow you to select the hardware address.
- “Use current protocol filter” checkbox—when selected, allows you to use the current protocol filter.

Utilization

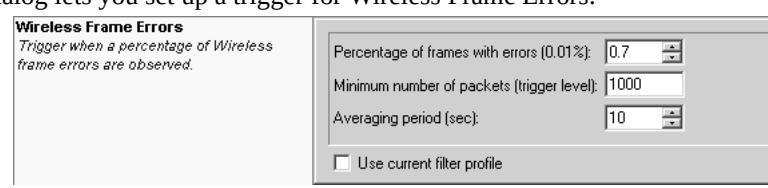
The Utilization setup dialog lets you set utilization thresholds that will trigger an action.


Utilization
Trigger when a percentage of network bandwidth utilization is observed.
Utilization trigger level (%): 5
Condition:
Maximum utilization 1 times reached during period
Average utilization
Averaging period (sec): 20
Use current filter profile

- Utilization trigger level (%) spinbox—allows you to set the percentage of network bandwidth utilization which you select as the trigger.
- Condition section—allows you to choose different ways that the utilization trigger can be reached. Maximum utilization is the condition when the actual utilization has reached a user-specified number of times. Average utilization is the condition when the network’s average utilization is greater than the utilization trigger.
- “Averaging period (sec)” spinbox—allows you to set the amount of time, in seconds, that data will be collected and averaged before a value is considered for the trigger. Sampling is every second. Values can be from 1 to 100 (seconds).
- “Use current protocol filter” checkbox—when selected, allows you to use the current protocol filter.

Wireless Frame Errors

This dialog lets you set up a trigger for Wireless Frame Errors:

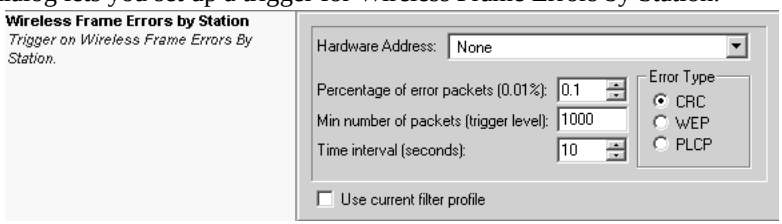

Wireless Frame Errors
Trigger when a percentage of Wireless frame errors are observed.
Percentage of frames with errors (0.01%): 0.7
Minimum number of packets (trigger level): 1000
Averaging period (sec): 10
Use current filter profile

- “Percentage of frames with errors” spinbox—Set the percentage of errors that will trigger an alarm.
- “Minimum number of packets (trigger level)” spinbox—Set the minimum number of error packets that will trigger an alarm.

- “Averaging period (sec)” spinbox—Specify how long to collect packets for calculating the average.
- “Use current filter profile”—When checked, causes Observer to only look at traffic that falls within the current filter profile when calculating the trigger values.

Wireless Frame Errors by Station

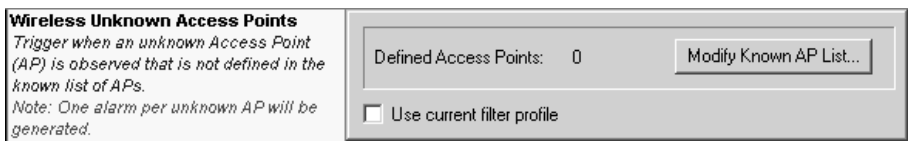
This dialog lets you set up a trigger for Wireless Frame Errors by Station:



- “Hardware address” spinbox—Specify a hardware address. Until you specify a hardware address, the trigger is not activated.
- “Percentage of error packets” spinbox—Set the percentage of errors that will trigger an alarm.
- “Min number of packets (trigger level)” spinbox—Set the minimum number of error packets that will trigger an alarm.
- “Averaging period (sec)” spinbox—Choose how long to collect packets for calculating the average.
- “Error Type” radio buttons—Choose CRC (Cyclical Redundancy Check), WEP (Wireless Equivalency Privacy), or PLCP (Physical Layer Convergence Protocol).
- “Use current filter profile”—When checked, causes Observer to only look at traffic that falls within the current filter profile when calculating the trigger values.

WIreless Unknown Access Points

This dialog lets you set up a trigger for unknown access points:

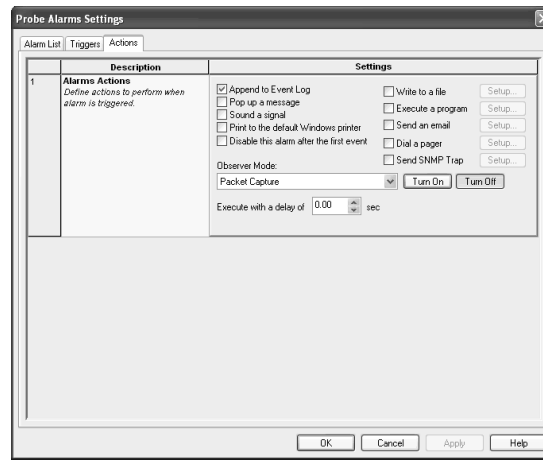

Wireless Unknown Access Points
Trigger when an unknown Access Point (AP) is observed that is not defined in the known list of APs.
Note: One alarm per unknown AP will be generated.
Defined Access Points: 0
Modify Known AP List...
Use current filter profile

- “Modify Known AP” button—Launches a dialog from which you can provide a list of known Access Points.
- “Use current filter profile”—When checked, causes Observer to only look at traffic that falls within the current filter profile when looking for an unknown AP.

Actions

Once a trigger condition is reached, Observer allows you to configure an action to take place. A number of different actions are possible. An action is independent of the actual trigger or alarm (i.e., any action can be configured for any trigger or alarm).

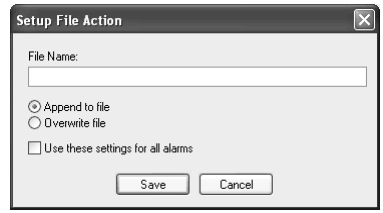
One action or set of actions can be defined for all triggers, or a separate action or set of actions can be configured for each trigger separately. The checkbox at the bottom of the Alarm List dialog toggles the ability to set actions separately for each trigger.



The Actions dialog displays the following action choices:

- Start/Stop Observer mode—automatically Starts/Stops any one of the listed modes (in the dropdown dialog) when the trigger condition is reached.
- “Append to Event Log” checkbox—when selected, Observer writes the trigger condition to the event log. The event log is displayed in the initial Triggers and Alarms dialog.
- “Pop up a message” checkbox—when selected, prompts Observer to pop up a message window on the Observer station notifying you of the trigger condition. This message box will display the trigger condition.
- “Sound a signal” checkbox—when selected, sounds an audible signal when the trigger condition is reached.

- “Print to the default Windows printer” checkbox—when selected, prompts Observer to print a trouble ticket to the default Windows printer. The trigger condition will be printed on the trouble ticket.
- “Disable this alarm after the first event” checkbox—when selected, stops the Trigger/Alarm mode after the first occurrence of the trigger condition.
- “Write to a file” checkbox—when selected, prompts Observer to write the current trigger condition to a specified file and activates the Setup button. When the Setup... button is clicked, the Setup File Action dialog is displayed.



  - “File Name” textbox—allows you to specify the file name.
  - APPEND TO FILE option button—if selected, appends the file.
  - OVERWRITE FILE option button—if selected, overwrites the file.
  - “Use these settings for all alarms” checkbox—if selected, settings are used for alarms.
- “Execute a program” checkbox—when selected, prompts Observer to execute a program and activates the Setup button. When the Setup button is clicked, the Setup Execute Command Action dialog is displayed.

Setup Execute Command Action
Command Line:
Write the last log entry
Write the whole event log
Note: The entry LOGFILE in the command line will be replaced by the actual temporary file name when executing the command.
Use these settings for all alarms
Save
Cancel

  - “Command Line” textbox—allows you to enter a command line.

When specifying a program to execute, you may include the option -LOG in the command line. When -LOG is specified in the command line, a temporary file name pointing to a file containing the whole event log or the last log entry will be substituted for the -LOG flag.

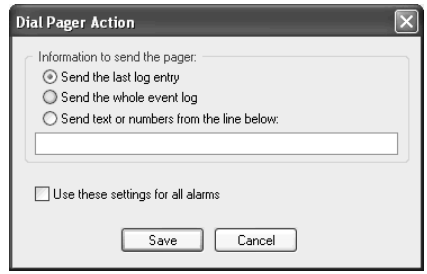
  - WRITE THE LAST LOG ENTRY option button—if selected, writes the last log entry.

- WRITE THE WHOLE EVENT LOG option button—if selected, writes the whole event log.
- "Use these settings for all alarms" checkbox—if selected, settings are used for alarms.

- "Send an email" checkbox—when selected, instructs Observer to send an email message as the action and activates the Setup button.

  You must set up the general email server information in the Options > Observer General Options > Email Notifications tab. see "Observer General Options – Email Notifications Tab" on page 79.

- "Dial a pager" checkbox—when selected, instructs Observer to send information to a pager as the action, and activates the Setup icon. When the Setup icon is clicked, the Dial Pager Action dialog is displayed.


Dial Pager Action
Information to send the pager:
Send the last log entry
Send the whole event log
Send text or numbers from the line below:
Use these settings for all alarms
Save
Cancel

Information to send the pager:

- SEND THE LAST LOG ENTRY option button—when selected, sends the last log entry to the pager.
- SEND THE WHOLE EVENT LOG option button—when selected, sends the entire contents of the event log to the pager.
- SEND TEXT OR NUMBERS FROM THE LINE BELOW option button—when selected, sends whatever is listed in the edit box to the pager.
- Blank textbox—allows you to enter specific text or numbers for the pager to send.
- "Use these settings for all alarms" checkbox—if selected, settings are used for alarms.

- "Send SNMP Trap" checkbox—when selected, sends an SNMP trap to a designated IP address and activates the Setup button. When configured to send a trap as an alarm action, Observer sends one of two SNMP "enterprise" traps, depending upon whether the event is a threshold event—utilization exceeding the set threshold level, for example entries, or a single event, such as the appearance of an unknown IP address.

The Management Information Base, or MIB, for Observer's traps is NETINST-MIB.MIB and will be found in the "Observer Files" directory.

> While this file is not needed in order to configure Observer to send an SNMP trip, it will be needed in order to configure the SNMP device or program receiving the trap.

Clicking the SETUP button displays the **Setup Send Trap Action** dialog.

- "Destination IP Address" textbox—allows you to set the IP address of the station to which the SMTP trap is to be sent.
- "Destination Port" textbox—allows you to set the IP address of the station (usually a personal computer) to which the SMTP trap is to be sent.
- "Community String" textbox—allows you to set the community name, or password, of the station to which the SMTP trap is to be sent.
- "Use these settings for all alarms" checkbox—when selected, the same settings will be used for all alarm actions that send SMTP traps.

> You cannot manually configure which trap is sent. Observer chooses the appropriate trap automatically.

FDDI Network Vital Signs

Provides a summary of FDDI network errors.

Menu Path

When FDDI is the active Probe or Device, select

Statistics-=>Network Vital Signs

Purpose

FDDI Vital Signs provides a summary of the errors occurring on an FDDI ring mapped with current error conditions on your network.

This display has been designed to give you a snapshot of error conditions and the importance of those error conditions with respect to the current network activity. These error conditions are displayed as three different error groups and beacons. This

display shows aggregate errors for your ring. Should these aggregate errors indicate a problem, specific errors by station are available in the FDDI Errors by Station dialog, and complete SMT and MAC by station information is available in the FDDI SMT and MAC decodes found in Packet Capture and Decode.

The error groups are Beacons, Error Count, Lost Count, and Not Copied.

Beacons

Beacons indicate that a card (or cards) cannot insert into the ring. Beaconing is used by FDDI to isolate a break in the FDDI ring. If the node that is beaconing does so for more than 10 seconds, the ring will assume that this node has a stuck beacon, and the ring will initiate a self test for each node on the ring. If a node fails the self test, it will remove itself from the ring. The upstream neighbor on the ring will identify the beaconing station.

Error Count

An Error Count indicates defective frames on the ring.

Lost Count

Lost Count indicates packets that went around the ring with a valid destination address, but were not copied (received) by any station.

Not Copied

Not Copied is an SMT frame indicating that a packet was sent, but not copied to the receiving station. This usually happens because there was not enough buffer space on the receiving card.

It also points out the total number of SMT and MAC frames for the collection period. The collection period for the Network Vital Signs can be set under Options > Selected Probe or SNMP Device Properties > Vital Sign report (refresh) period (sec).

Wireless Vital Signs

Shows current wireless activity mapped with current wireless error conditions on a wireless network. An NI Wireless driver and supported card are required.

Menu Path

When the currently active probe or device is wireless, choose **Statistics->Network Vital Signs**.

Purpose

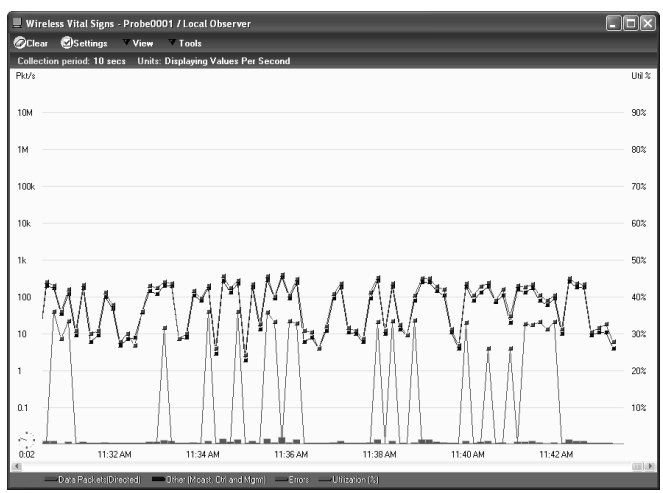
The Wireless Vital Signs mode shows current wireless activity mapped with current wireless error conditions on your WLAN. The Vital Signs mode displays a comprehensive snapshot of error conditions and of their criticality in the context of current WLAN activity. To pin down aggregate problems revealed by Wireless Vital Signs, go to Access Point Statistics, Top Talkers, and Errors by Station.

Another way to use this “at-a-glance” view of network health is to install Observer on a wireless laptop and watch what happens to the vital signs as you move the system around your office.

Available Views

- Graph View
- Dial View:
- List View

Graph View

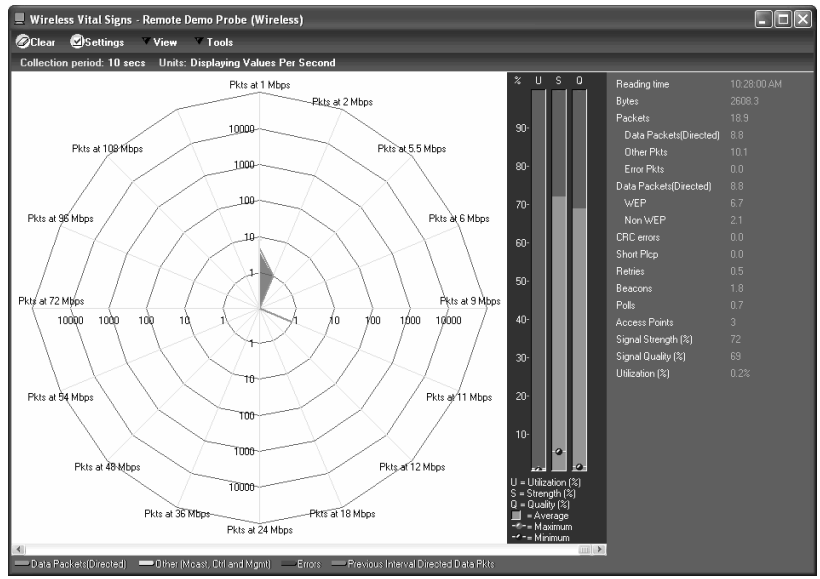


The Graph view of Wireless Network Activity shows the error rates and other statistics in spike meter with a user-selectable interval. You can use the scrollbar to move “backwards in time;” hovering the cursor over any point on the graph gives details about that point in time.

Right click Menu

Right clicking anywhere on the graph menu launches the Display Settings dialog, where you can set graph colors, and the time interval for sampling data.

Dial View:



In Dial View, vital signs are plotted against 4 axes, each representing one of the four protocol-defined bit rates. This allows you to see the relationships between:

- Data Packets (packets with a payload)
- Non-Data Packets (control, management, and beacon)
- Errors of all types, broken down by type in the table to the right of the graph display.

This lets you immediately see each statistic in its proper context. For example, an error rate of 50% is insignificant if Observer has only analyzed two packets, but quite significant if thousands of packets have been analyzed.

The bar graphs to the right of the dial show current bandwidth utilization (U), the average strength (S), and the average quality (Q) of the signal. These meters also indicate (with watermark “floats”) the minimum and maximum values that Observer has seen since the last polling period.

Network Summary

Shows a summary of current network activity in a browsable tree.

Menu Path

Statistics->Network Summary

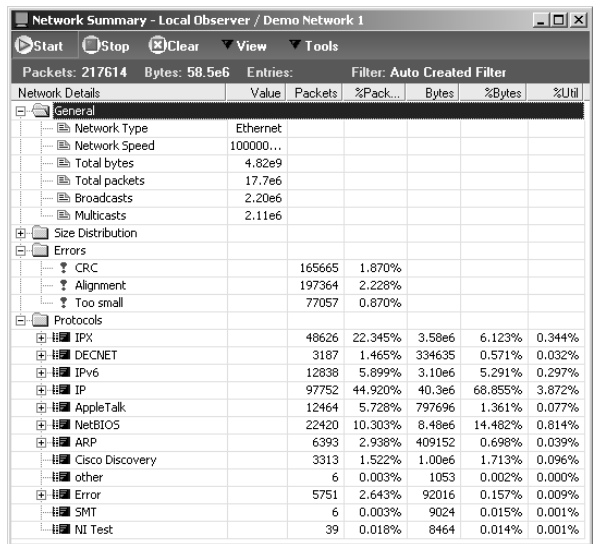
Purpose

The Network Summary's browsable tree is a convenient place to find all the major statistical counts of bandwidth usage, size distribution, protocols and errors for your network.

Available Views

- List View (which displays the tree)

List View:



Network Details	Value	Packets	%Pack...	Bytes	%Bytes	%Util
General						
Network Type	Ethernet					
Network Speed	100000...					
Total bytes	4.82e9					
Total packets	17.7e6					
Broadcasts	2.20e6					
Multicasts	2.11e6					
Size Distribution						
Errors						
CRC		165665	1.870%			
Alignment		197364	2.228%			
Too small		77057	0.870%			
Protocols						
IPX		48626	22.345%	3.58e6	6.123%	0.344%
DECNET		3187	1.465%	334635	0.571%	0.032%
IPv6		12838	5.899%	3.10e6	5.291%	0.297%
IP		97752	44.920%	40.3e6	68.855%	3.872%
AppleTalk		12464	5.728%	797696	1.361%	0.077%
NetBIOS		22420	10.303%	8.48e6	14.482%	0.814%
ARP		6393	2.938%	409152	0.698%	0.039%
Cisco Discovery		3313	1.522%	1.00e6	1.713%	0.096%
other		6	0.003%	1053	0.002%	0.000%
Error		5751	2.643%	92016	0.157%	0.009%
SMT		6	0.003%	9024	0.015%	0.001%
NI Test		39	0.018%	8464	0.014%	0.001%

Saving and Replaying Saved Statistical Modes

Observer allows all time-sensitive statistic displays to be saved and reloaded for later analysis.

All displays that allow this functionality include a Save Mode in Comma Delimited Format and a Load Comma Delimited File in that displays Tools menu, and in the Observer Main Window's File menu.

For example, to save the active Network Activity Display data, select File > Save Mode in Comma Delimited Format. By saving the file, you can later view the saved data by going back into the Network Activity Display and selecting File > Load Comma Delimited File. This will display a separate Network Activity Display with your historical data loaded

Trending and Analysis Menu

Network Trending Mode

Network Trending Overview

Observer's Network Trending mode, in conjunction with the Network Trending Viewer, allows you to collect, store, view, and analyze the network traffic statistics over long periods of time. This will provide you with baseline comparison data, which is often essential in identifying and troubleshooting network performance problems. Network Trending also generates text reports about network conditions over specified time periods.

You can configure Observer to run Network Trending mode continuously or start the Network Trending mode automatically every time you start Observer. The statistics data is stored in a format that can be easily compressed and passed for viewing to any site that has an Observer Network Trending Viewer installed. The Network Trending Viewer does not collect the traffic information, it only processes the information collected by Observer.

The task of collecting network statistics over a long period of time imposes limitations on the ways data can be collected and stored. Protocol analyzers can provide many types of information, and often it is difficult to know in advance what data will be needed to find the cause of an existing problem or to diagnose a developing one.

Ideally, it would be best to collect all of the data passing through the network and then go through the data back and forth with some kind of analysis tool and view the processed data from different perspectives. Unfortunately, the volume of data passing through a typical network is usually very high. The huge amount of data generated by capturing every packet over long periods of time would not be practical to store and analyze given a typical PC's disk and processor resources.

Protocol analyzers deal with this problem using a mechanism called "sampling." The term "sampling" refers to a method of collecting only some portion of the total data flowing on a network at any one moment and statistically adjusting the results for this as a representation of the total data sent on the network. This may mean that a protocol analyzer, through sampling, may process only one packet in every ten. The number "10" in this case is called a sampling divider. Since the protocol analyzer can keep up with the processing of every tenth packet in high and low traffic conditions, it

provides a more accurate statistical picture than a protocol analyzer that tries to process all incoming data. A protocol analyzer that tries to capture all incoming data will lose more packets during high traffic bursts and less in slower traffic periods.

Network Trending manages these enormous amounts of data in the following ways:

- First, it allows you to choose a sampling divider appropriate for your network. An approximate rule for selection of the sampling divider for a Pentium 166 MHz PC running Observer is the maximum expected bandwidth utilization divided by 4. This means that if the bandwidth utilization on the network often reaches 80% (this would be quite high), you will want to use the sampling divider 20 (or higher). You should select a still higher sampling divider on a slower PC. Statistically speaking, a sampling divider of 10 (i.e., 1 in 10 packets are sampled) collects plenty of data to "see" a complete picture of network traffic over a course of hours or days. In reality, a much larger divider can be used without the risk of erroneous results. Most modern PCs can easily handle this sampling rate on a 100MB/sec Fast Ethernet or 16MB/sec Token Ring.

  The sampling divider represents a trade-off between accuracy and speed. The higher the sampling divider, the less data that will be collected; thus, the less accurate the data collection. The lower the sampling factor, the slower the post-processing of data will be, as well as the higher the likelihood of non-statistically adjusted dropped data will affect your results.

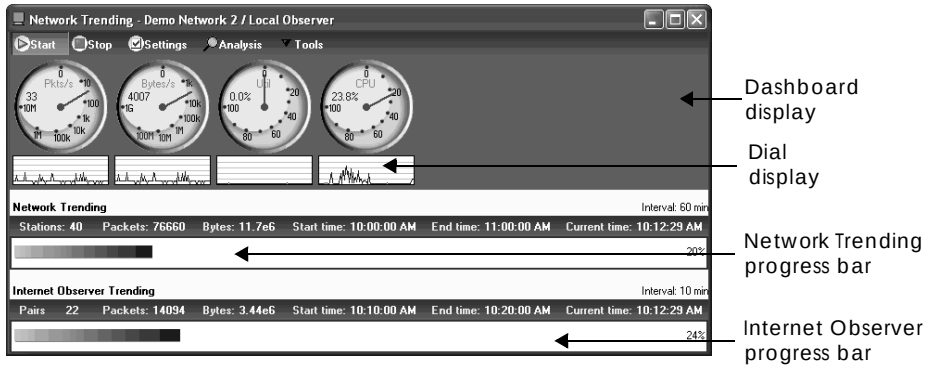
- Second, once the data is collected, the Network Trending Viewer aggregates the data to display information in a number of convenient summation-oriented charts, tables, or reports. The Network Trending Viewer lets you view data from a perspective of time, and thus gives you an overview of how your network is functioning over the course of hours, days, or weeks. This information will be useful in a number of ways, but specifically, it allows you to see trend information that would only be guesswork with a standard protocol analyzer's information. Trend data may show usage patterns that indicate the need for a configuration change, a change in how a system is used, or that there are infrequent, but foreseeable problems.

The Network Trending facility was integrated into Observer to provide a second perspective to the data Observer collects. Observer's standard modes are designed to give you an instant snapshot of the current condition of the network. This allows you to troubleshoot with instantaneous information. Network Trending provides a broader view of your network and gives you overall trend information. This trend information may be useful to solve a specific problem and can be used for long-term planning.

You can think of Network Trending as Observer information plotted against the added dimension of time.

Network Trending

Network Trending is where Observer collects data for later viewing with the Network Trending Viewer.



Network Trending and the Dashboard

The Dashboard display is combined with the Network Trending mode and Internet Observer Trending mode to supply a continuous heads-up display of the general network trends, Internet networking trends, and CPU conditions on the segment being monitored.

- Progress bar- The bar will fill up the progress track as each collection interval is completed. For example, if the collection interval is set for one hour, the bar will take one hour to fill up. This allows you to see at a glance the state of your collection.

  There are two progress bars: one displays the progress of Network Trending and the other displays Internet Observer Trending.

The Network Trending pane contains the following items:

- Interval—lists the block of time in which data will be collected.
- Stations—lists the number of stations on the network that have sent traffic during the present interval.
- Packets—lists the number of packets sent on the network during the present interval.
- Bytes—lists the number of bytes sent on the network during the present interval.
- Start time—displays the start time of the present interval.
- End time—displays the end time of the present interval.
- Current time—displays the current time.

The Internet Observer Trending pane contains the following items:

- **Pairs**—lists the number of station pairs on the network that have exchanged IP traffic during the present interval.
- **Packets**—lists the number of IP packets sent on the network during the present interval.
- **Bytes**—lists the number of bytes sent in IP packets on the network during the present interval.
- **Start time**—displays the start time of the present interval.
- **End time**—displays the end time of the present interval.
- **Current time**—displays the current time.

The four dial displays are:

- **Packets/second (Pkt/s)**—displays the packets per second rate in dial and history (the graph below the dial) format.
- **Bytes/second (B/s)**—displays the bytes per second rate in dial and history (the graph below the dial) format.
- **Bandwidth Utilization (Util)**—displays the currently monitored segments bandwidth utilization in dial and history (the graph below the dial) format.
- **Processor Utilization (CPU)**—displays the local (or Probe) PC's current processor utilization in dial and history (the graph below the dial) format.

The Dashboard information pane contains the following items:

- **Stations**—lists the number of stations on the network that have sent traffic during the current Network Trending session.
- **Packets**—lists the number of packets sent on the network during the current Network Trending session.
- **Bytes**—lists the number of bytes sent on the network during the current Network Trending session.

The dashboard is always on when the mode is displayed. The dashboard will display information from the time Network Trending was started—it shows a continuous display, not just of the current poll.

There are no display configuration items for the Dashboard.

Collecting Network Trending Information

Using Network Trending mode to collect the data involves the following steps:

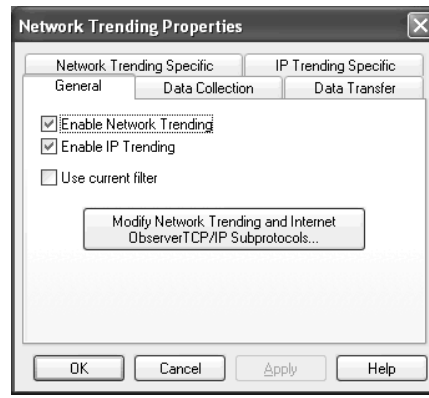
6. To start Network Trending, choose Trending/Analysis > Network Trending from the main Observer menu or click on the Start button on the toolbar. The **Network Trending** dialog will be displayed.
7. Click the **Settings** button to enter the **Network Trending Settings** dialog. See "Network Trending Setup" below.
8. Configure your collection parameters.
9. Click the **Start** button. Observer will begin to collect data. This may take from minutes to hours depending on the amount of time you set the Statistics Collection Interval.

Network Trending Setup

Clicking the **Settings** button displays the **Network Trending Settings** dialog.

> We recommend using the default setup options for your first few sessions (and possibly setting the collection interval to one minute). After you get a feel for how Network Trending works, you can experiment with the additional settings.

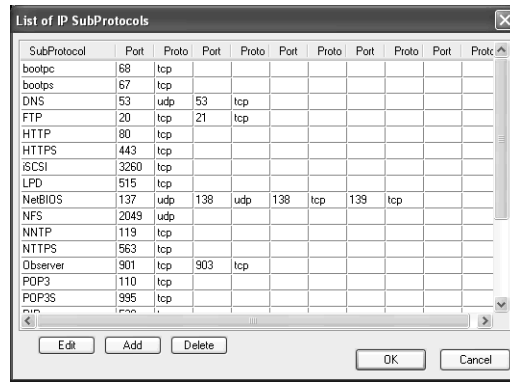
Network Trending Setup – General Tab



The General tab includes the following items:

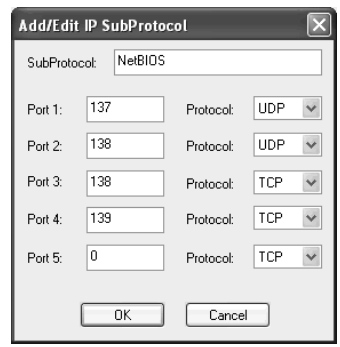
- "Enable Network Trending" checkbox—allows you to enable/disable Network Trending.
- "Enable IP Trending" checkbox—allows you to enable/disable IP Trending.
- "Use current filter" checkbox—allows you to set Network Trending to use the current filter when collecting information.

- “Modify Network Trending and Internet Observer TCP/IP Subprotocols” button—click to display the List of IP SubProtocols dialog.



The List of IP SubProtocols dialog displays the SubProtocols and allows you to add a new one, change an existing one, or delete an existing one.

1. To edit or add a protocol, click on the EDIT or ADD button.
2. The **Add/Edit IP SubProtocol** dialog is displayed.

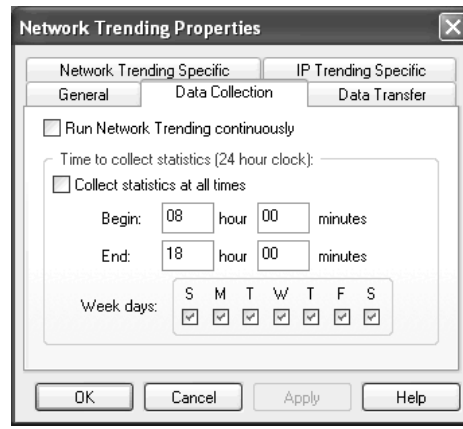


3. If you are editing a protocol, the protocol you selected on the List of IP SubProtocols will be displayed in the SubProtocol textbox. The information in this textbox is editable.
4. If you are adding a protocol, enter the desired name of the SubProtocol in the textbox. You can have a total of 12 subprotocols in your list of IP SubProtocols.
5. Add or edit the port numbers in the Port 1, Port 2, Port 3, Port 4, or Port 5 textboxes.
6. Select either TCP or UDP from the dropdown boxes.
7. Click on the Ok button to display the **List of IP SubProtocols** dialog.
8. If you need to delete a protocol, click on the DELETE button. The confirm **Delete IP SubProtocol** dialog will be displayed.

9. To delete the selected protocol, click on the YES button. To cancel the delete request, click on the NO button.

Network Trending Setup – Data Collection Tab

This setup allows you to select the days and times you wish to collect trending data.



- "Run Network Trending continuously" checkbox—allows you to select to run Network Trending at all times Observer is running, even if it is not displayed.

  If you want to be sure that Network Trending is running at all times that the Observer PC is on, check this box and add Observer to your Windows Startup group.

Time to collect statistics (24 hour clock):

- "Collect statistics at all times" checkbox—allows you to select to have statistics collected at all times Network Trending is running. If you check this item, the Begin, End, and Week days boxes will be disabled. If your business hours are from 8:00 am to 5:00 pm and employees generally show up a little early and stay a little late, you would set this to begin at 07 hour 00 min and end at 18 hour and 00 min. This begins statistics at 7:00 am and ends the collection each day at 6:00 pm. You can also select specific days of the week for collection.
- "Begin hour and minutes" textboxes—allow you to enter the time the collection of trending data will begin on the days selected. You must enter time information using military time (i.e., 8 am = 0800, 3 pm = 1500).
- "End hour and minutes" textboxes—allow you to enter the time the collection of trending data will end on the days selected. You must enter time information using military time (i.e., 9:30 am = 0930, 4:15 pm = 1615).

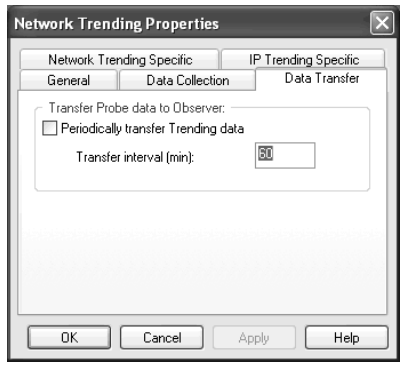
  Setting only your business' main traffic times is a good idea for two reasons: it allows you to view only the important data without cluttering displays with additional data, and it drastically saves on disk space regardless of the amount of

data flowing on your network (when Network Trending uses a constant amount of disk space for each collection period).

- "Week days" checkboxes—allow you to select the days trending data will be collected.

Network Trending Setup – Data Transfer Tab

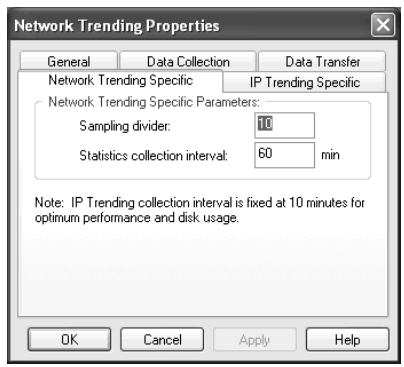
The Data Transfer tab is only relevant when using a remote Probe to transfer data to Observer.



- "Periodically transfer Trending data" checkbox—allows you to setup the Probe to transfer data according to the interval set.
- "Transfer interval (min)" textbox—sets the time interval, in minutes, between transfers of data from the remote Probe to the local Observer console.

Network Trending Setup – Network Trending Specific Tab

The Network Trending Specific tab contains the Network Trending Specific Parameters box.

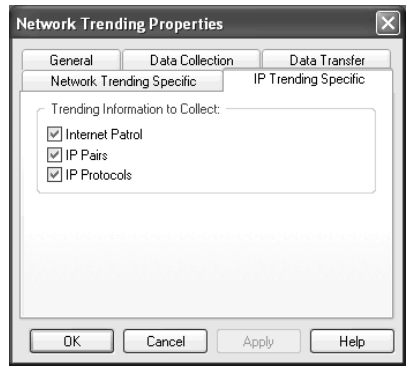


- "Sampling divider" textbox—allows you to set the value for *n*, where Network Trending will look at one out of every *n* packets.

- “Statistics collection interval” textbox—allows you to set the time period, in minutes, for which Network Trending will log data.

Network Trending Setup – IP Trending Specific Tab

The IP Trending Specific tab contains three checkboxes, permitting the user to choose which information to collect.

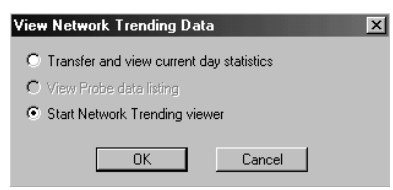


Trending Information to Collect:

- “Internet Patrol” checkbox—causes Network Trending to collect Internet Patrol information.
- “IP Pairs” checkbox—causes Network Trending to collect IP Pairs information.
- “IP Protocols” checkbox—causes Network Trending to collect IP Protocols information.

Network Trending Viewer

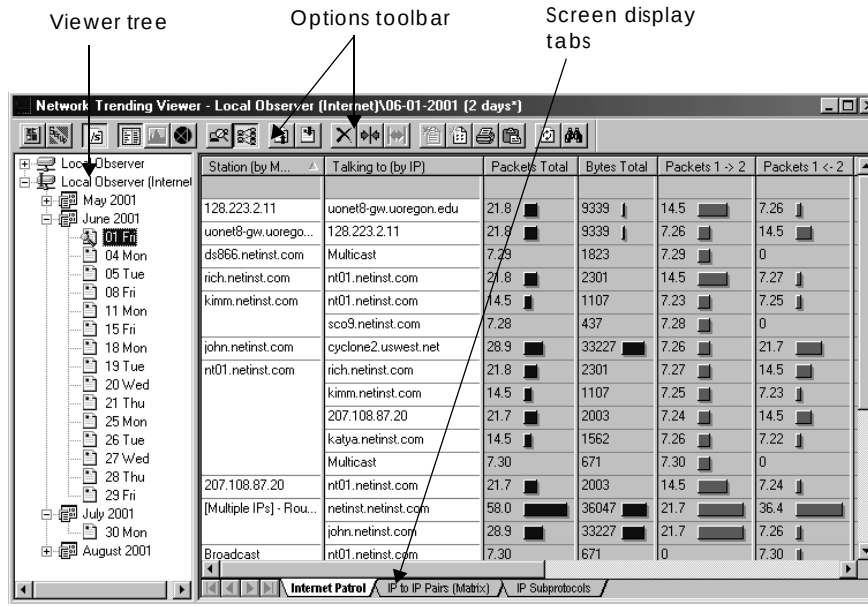
To access Network Trending Viewer select Trending/Analysis > Start Network Trending Viewer or click on the icon on the toolbar. If you click on Start Network Trending Viewer from the Trending/Analysis menu, the Network Trending Viewer mode will be displayed. If you click on the icon, the **View Network Trending Data** dialog will be displayed.



- Transfer and view current day statistics option button—when selected, allows you to view the current day statistics.

- View Probe data listing option button—when selected, allows you to view the Probe data listing.
- Start Network Trending viewer option button—when selected, opens the Network Trending Viewer.

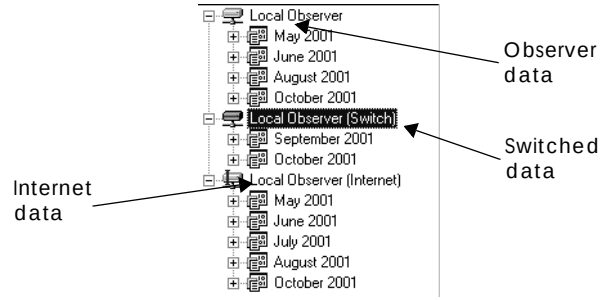
The Network Trending Viewer is the facility where Network Trending and Internet Observer Trending data can be viewed and manipulated. Network Trending Viewer can display statistical data that has been collected in a chart or list format—for the network as a whole and for every individual station present on the network at any moment in time.



Viewer Tree

The Viewer tree is where the user gets an overall view of the time periods for which trending data is available for Network Trending (shared and switched) and Internet Observer Trending. Branches with a root entry ending “Observer” or “Probe” contain

Network Trending data. Branches with a root entry ending in “(Internet)” contain Internet Observer data. Branches ending in “(Switch)” contain switch trending data.



Within the branch, the calendar tree displays each Probe’s trending data in a tree-format based on first the Probe, the month, the day, and then the station.

The Network Trending Viewer’s main screen displays a Viewer tree, a date or calendar tree, a toolbar, a View/Display area, and (possibly) scroll bars.

The Network Trending Viewer Toolbars

The Network Trending Viewer has two toolbars which have menu access throughout the Modes Menu:

- Statistics Toolbar (will not be displayed if viewing Internet data)
- Options Toolbar

The Statistics Toolbar

The Statistics Toolbar contains the following buttons in order from top to bottom:

	Stations activity time—displays when each station was first seen on the network and when it was last seen on the network.
	Top Talkers—displays each station's total packets in and out, and each station's total bytes in and out.
	Packet Size Distribution—displays the packet size distribution.
	Bandwidth Utilization—displays the bandwidth utilization (maximum, average, and minimum) for the selected day or days. You must have selected "show date by time."
	Router Bandwidth Utilization—displays router bandwidth utilization in total packet or percentage format. You must have a router and a router speed selected in Observer's Router Observer mode to see statistics in this dialog and you must have the router selected in the list.
	Protocols—displays the protocols seen on the network. Available types are: TCP/IP, IPX/SPX, NetBIOS (including NetBEUI), AppleTalk, DECNET, SNA, and Other.
	TCP/IP Subprotocols—displays the subprotocols of TCP/IP seen on the network by type. This includes ARP, RARP, IP, TCP, UDP, ICMP and Other.
	IPX Subprotocols—displays the subprotocols of IPX/SPX seen on the network broken out by type. Available types are: SPX, IPX, SAP, NCP, RIP, NetBIOS, Diagn (Diagnostic), WatchDog, Serializ (Serialization), and Other.
	IP Applications—displays configurable (port-based) IP applications. These are configurable in the Network Trending Setup dialogs.
	Errors—this display will be dependent on the topology of the trending data. Selecting a day on the calender tree will display the aggregate errors for the entire network based on time stamps or station (depending on the state of the "Show data by station" or "Show data by time" buttons). *When a **day** is selected on the calendar tree, you will see aggregate errors for the entire network.*
	Token Ring errors—displays all Token Ring soft errors. This data is similar to the Token Ring Network Vital Signs in Observer.
	Ethernet Frame errors—this displays the frame errors as collected by the NDIS MAC driver. This data is analogous to the Ethernet Network Vital Signs in Observer.

	FDDI frame errors—this displays the frame errors as collected by the NDIS MAC driver. This data is analogous to the FDDI Network Vital Signs in Observer. *When a **station** is selected on the calendar tree, you will see aggregate errors by station displayed in Observer.*

	Token Ring errors (by type)—displays the Token Ring errors by severity type. This data is analogous to the Token Ring Errors by Station display in Observer.
	Network Errors by Station—displays the Ethernet station errors if you are using a supported network adapter card and driver that can report errors by station. This data is analogous to the Network Errors by Station display in Observer.
	FDDI by station—displays the FDDI station errors. This data is analogous to the FDDI Errors by Station display in Observer.

The Options Toolbar (IP Trending)

When displaying IP trending data, the Options Toolbar contains the following buttons—in order from left to right:

	Display Properties—display properties can be set by right-clicking on the display or by clicking the DISPLAY PROPERTIES button. The Display Properties dialog offers configuration options for the components of the display, and changes depending whether you are viewing a list or a graph.
	General Viewer Properties—sets general viewer properties for the Network Trending Viewer.
	Show data per second—toggles between showing data as time-rated (per-second) or non-time rated (generally as packets or bytes).
	Show incoming packets—shows data by destination.
	Show outgoing packets—shows data by source.
	Show all packets—shows data by source and destination.
	Show data by station—shows all data by station.

	Show data by time—shows data by time.
	List—shows data in list format.
	Line graph—shows data as a 2-D line graph (not available in all modes).
	Alternate columns—shows data as an alternate column graph.
	Separate columns—shows data as a separate column graph.
	Pie chart—shows data as a pie chart.
	Go to previous day—moves to the previous day's trending information.
	Go to next day—moves to the next day's trending information.
	Go to current day—moves to the current day's trending information.
	Delete—deletes a day's trending data.
	Compress—compresses a day's or group of days' data for disk storage efficiency. When data has been compressed, you must first decompress it in order to view it.
	Decompress—decompresses a day's or group of days' data. This is necessary in order to view compressed data.
	Create report—the create report dialog lets you specify reporting options.
	Create Comma-Separated-Values File—exports trending data to a file in which values are separated by commas, permitting the importation of trending data into spreadsheets, databases, and other programs that support this format.
	Print—displays the Windows print dialog, enabling trending data to be printed to a user-selected printer.
	Copy to Clipboard—copies the currently-displayed data, in the currently-displayed format, to the Windows clipboard.

	Refresh—refreshes the current display, reloading data from the hard drive, if necessary.
	Find—displays the Find dialog, enabling the user to search trending data for a given character string.

The Options Toolbar (Internet Trending)

When displaying Internet trending data, the Options Toolbar contains the following buttons, in order from left to right:

	Display Properties—display properties can be set by right-clicking on the display or by clicking the DISPLAY PROPERTIES button. The Display Properties dialog offers configuration options for the components of the display and changes depending whether you are viewing a list or graph.
	General Viewer Properties—sets general viewer properties for the Network Trending Viewer.
	Show data per second—toggles between showing data as time-rated (per- second) or non-time rated (generally as packets or bytes).
	List—shows trending data in a tabular list view.
	View Graph—shows trending data as a configurable line or bar graph.
	Pair Circle—shows trending data as a pair circle, similar to Pair Statistics (Matrix) mode.
	View Connection Detail—views one selected connection in detail. Clicking this button toggles the VIEW ALL STATIONS button off.
	View All Stations—views all connections for the selected time period. Clicking this button toggles the VIEW CONNECTION DETAILS button off.
	Go to previous day—moves to the previous day's trending information.
	Go to next day—moves to the next day's trending information.
	Delete—deletes a highlighted day's trending data.

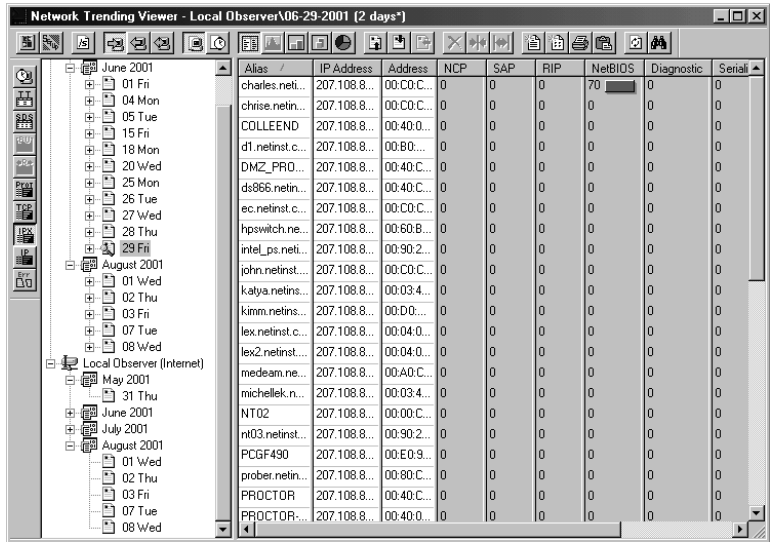
	Compress—compresses a day's or group of days' data for disk storage efficiency. When data has been compressed, you must first decompress it in order to view it.
	Decompress—decompresses a day's or group of days' data. This is necessary in order to view compressed data.
	Create report—the create report dialog lets you specify reporting options.
	Create Comma-Separated-Values File—exports trending data to a file in which values are separated by commas, permitting the importation of trending data into spreadsheets, databases, and other programs that support this format.
	Print—displays the Windows print dialog, enabling trending data to be printed to a user-selected printer.
	Copy to clipboard—copies the currently-displayed data, in the currently-displayed format, to the Windows clipboard.
	Refresh—refreshes the current display, reloading data from the hard drive, if necessary.
	Find—displays the Find dialog, enabling the user to search trending data for a given character string.

Using Network Trending Viewer to Display Results

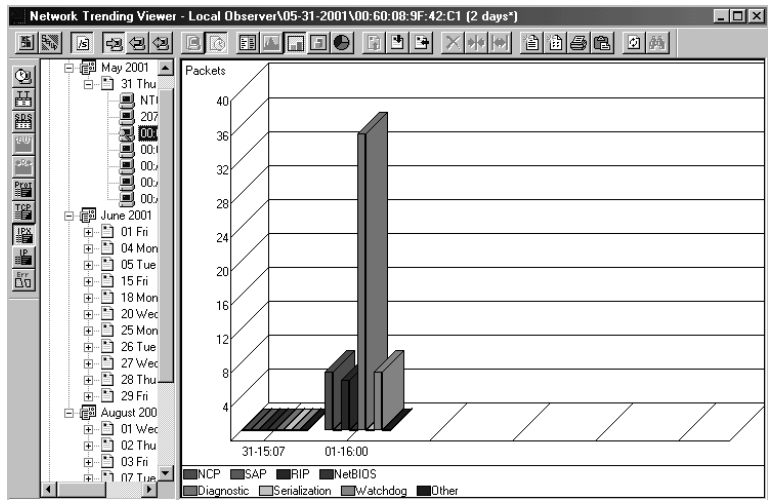
To start Network Trending Viewer:

1. Open Network Trending Viewer.
2. Select a date by clicking on the date from the tree display on the left side of the Trending Viewer. The Network Trending Viewer, by default, will only "view" one day at a time. Should you want to view more than one day, select the Setup/Time Settings button and set the number of days you would like to view after the day selected.

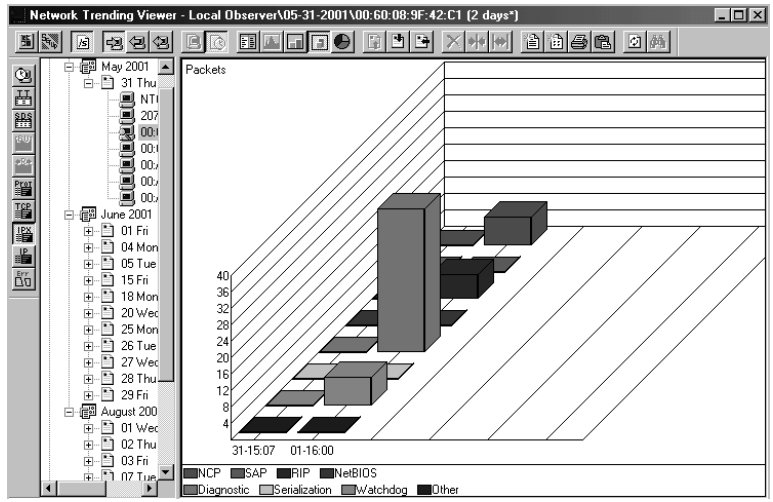
Network Trending Viewer – Observer List View



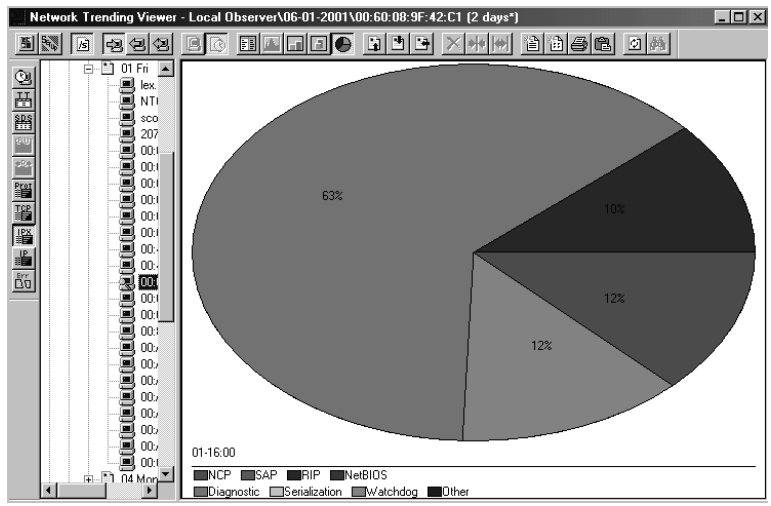
Network Trending Viewer – Observer Alternate Columns View



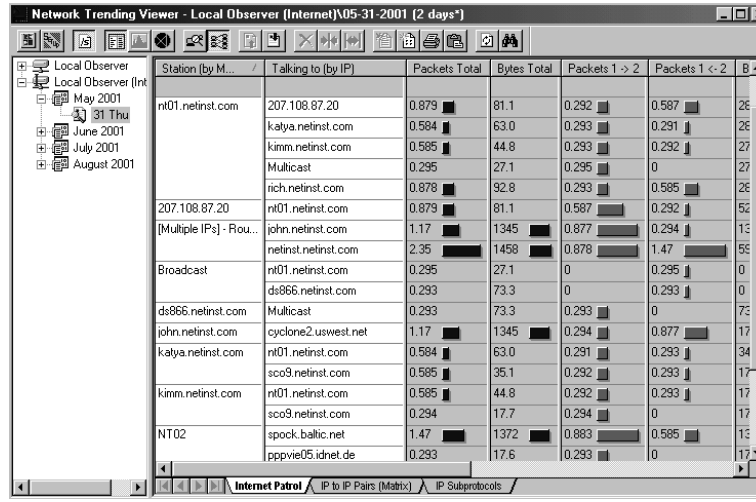
Network Trending Viewer – Observer Separate Columns View



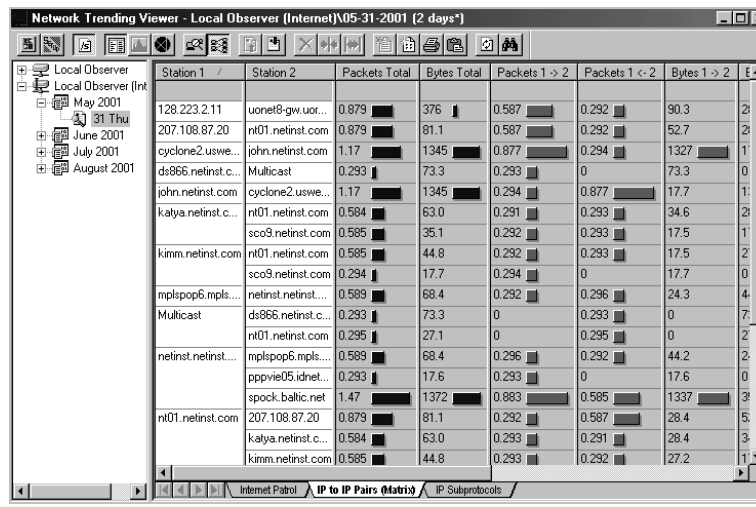
Network Trending Viewer – Pie Chart View

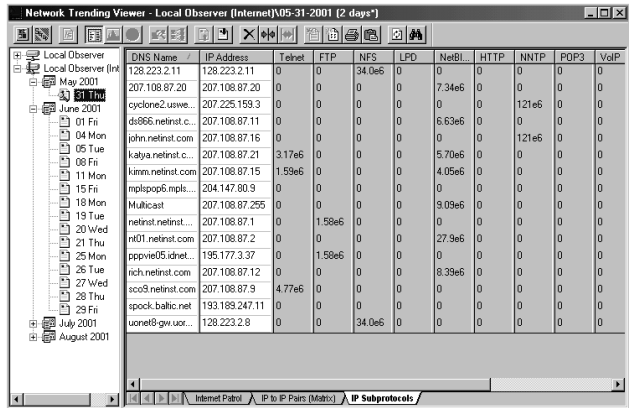


Network Trending Viewer – Internet List Internet Patrol View



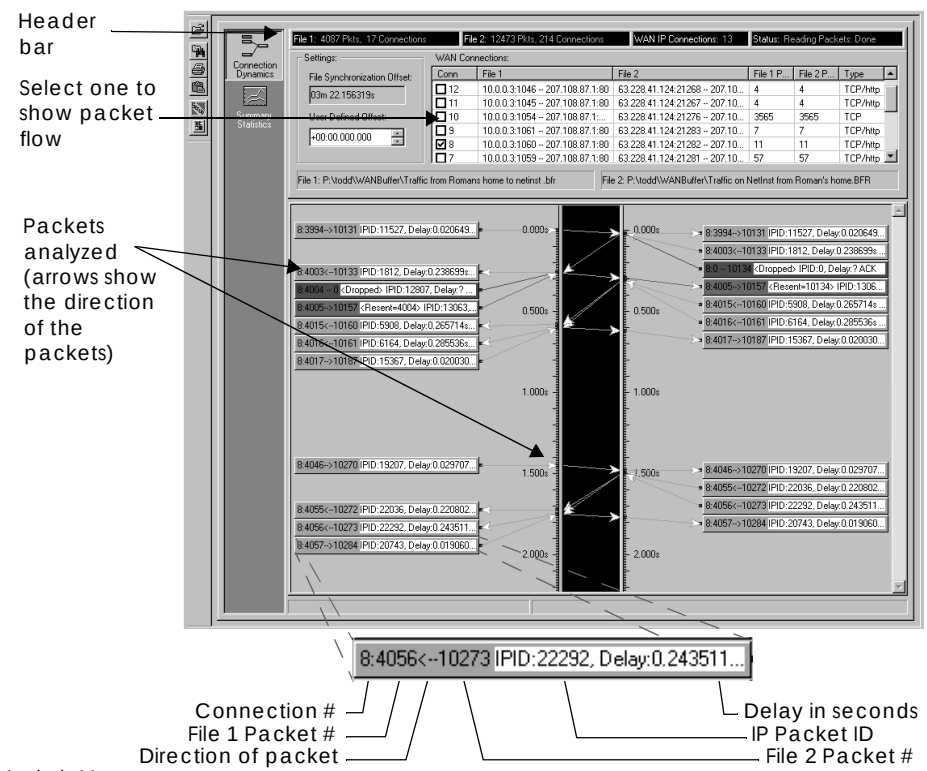
Network Trending Viewer – Internet List IP to IP Pairs (Matrix) View





WAN Delay Analysis

WAN Delay Analysis compares both ends of a conversation from two probes. The conversation can be between two probes or between a probe and a local probe. WAN Delay Analysis determines packet connection pairs and measures the amount of delay between the packet pairs.



When you select the **Connection Dynamics** button, the following items are displayed in the Header bar:

- File 1—displays the number of packets and connections analyzed for File 1.
- File 2—displays the number of packets and connections analyzed for File 2.
- WAN IP Connections—displays the number of WAN IP connections analyzed.
- Status—displays the current status of the analysis.

Settings:

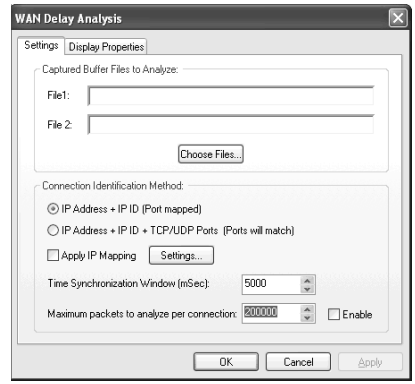
- “File Synchronization Offset”—the offset is computed to compensate for the time zone and processor clock differences between the systems being analyzed.
- “User Defined Offset” spinbox—allows you to add an additional time offset to the File Synchronization Offset described above.

WAN Connections:

- “Conn” checkbox—allows you to select which connection you wish to analyze.
- File 1—displays the IP addresses of the first packet.
- File 2—displays the IP addresses of the second packet.
- File 1 Pkts—displays the number of packets in File 1.
- File 2 Pkts—displays the number of packets in File 2.
- Type—displays the connection type between File 1 and File 2.

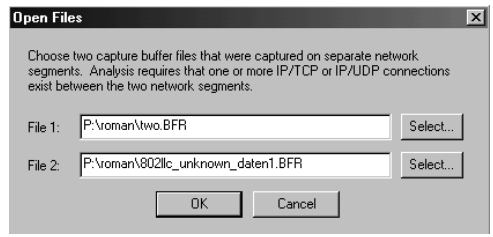
The following items are displayed in the main table:

- Packet comparison—displays the packets and common connections; you may click on a packet to view the packet flow.



Captured Buffer Files to Analyze:

- "File 1" and "File 2" textboxes—displays the captured buffer file you have selected; to edit this selection, you must click on the Choose Files button.
- Choose Files button—displays the Open Files dialog.


Open Files
Choose two capture buffer files that were captured on separate network segments. Analysis requires that one or more IP/TCP or IP/UDP connections exist between the two network segments.
File 1:
P:\roman\two.BFR
Select...
File 2:
P:\roman\802llc_unknown_daten1.BFR
Select...
OK
Cancel

  - "File 1" textbox—allows you to enter the first capture file buffer name you wish to compare.
  - "File 2" textbox—allows you to enter the second capture file buffer name you wish to compare.
  - Select buttons—allows you to select the files you wish to select by displaying the standard Windows Open dialog.

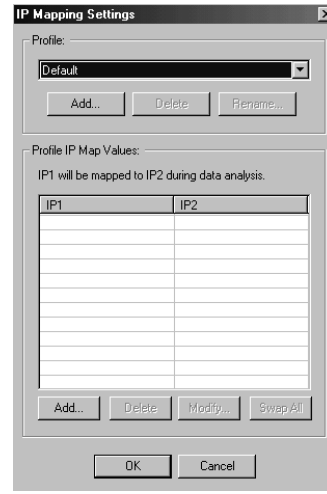
Connection Identification Method:

- IP Address + IP ID (Port mapped) option button—allows you to select to view the IP address and IP ID.
- IP Address + IP ID + TCP/UDP Ports (Ports will match) option button—allows you to view all ports that match.
- "Apply IP Mapping" checkbox—allows you to manually set the IP matching.
- Settings button—displays the IP Mapping Settings dialog; only active if the "Apply IP Mapping" checkbox is selected. see "IP Mapping Settings" on page 189.

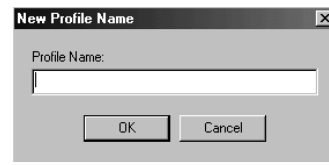
- “Time Synchronization Window (mSec)” spinbox—allows you to set the maximum number of seconds for time synchronization.
- “Maximum packets to analyze per connection” spinbox—allows you to select the maximum number of packets you want to analyze; only active if the “Enable” checkbox is selected.
- “Enable” checkbox—allows you to limit the number of packets to be analyzed.

IP Mapping Settings

To display the IP Mapping Settings dialog, select WAN Analysis Delay > Setup > Apply IP Mapping and click on the SETTINGS button.

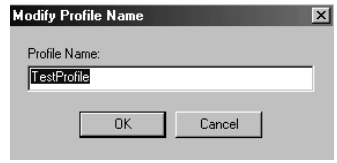


- Profile dropdown—displays the profile names available.
- Add button—displays the New Profile Name dialog.



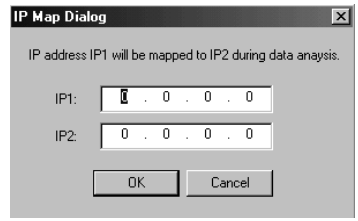
- Delete button—displays the Delete dialog.

- Rename button—displays the Modify Profile Name dialog.



Profile IP Map Values:

- IP1—displays the IP address of the first probe you are capturing packets on.
- IP2—displays the IP address of the second probe you are capturing packets on.
- Add button—displays the IP Map dialog.

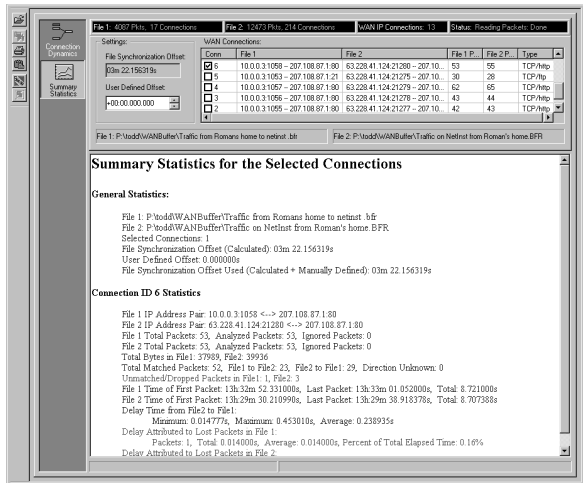


- Delete button—allows you to delete an IP address.
- Modify button—allows you to modify an IP address.
- Swap All button—allows you to swap all IP addresses from the IP1 column to the IP2 column.

WAN Delay Analysis – Summary Statistics

The Summary Statistics view of WAN Delay Analysis gives you a textual display of the selected connections (computed in the WAN Delay Analysis – Connection Dynamics view). You may select one or many connections. The statistics summary gives you details on the analyzed packets, such as: number of packets analyzed, delay

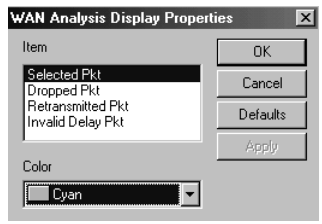
time, matched packets, direction of packets, dropped packets (will be displayed in red type), time of first packet, and time of last packet.



IP Mapping Settings Right-Click Menu

- Add—displays the IP Map Dialog.
- Modify—displays the current IP addresses in the IP Map Dialog.
- Delete—displays the Delete Confirmation dialog.
- Swap—allows you to swap the highlighted addresses; the Swap Confirmation dialog will be displayed.
- Swap All—allows you to swap all addresses in the IP Mapping Settings dialog; the Swap Confirmation dialog will be displayed.

WAN Delay Analysis – Display Properties



- "Item" list—allows you to select which item to be configured.

"Color" dropdown—allows you to select the color of the display item you have selected.

Application Analysis

Menu Path

Trending/Analysis->Application Analysis

Purpose

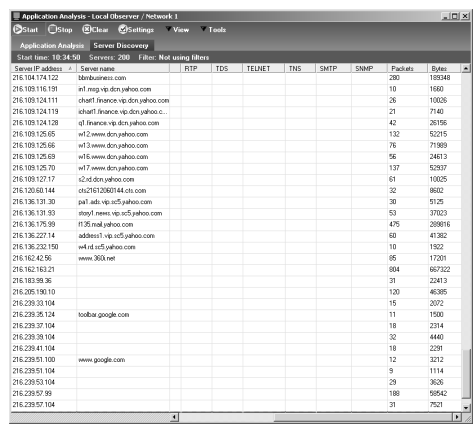
Application Analysis lets you view detailed information about how a server is performing, giving you an accurate picture of the user's experience of your network application, such as response time and failed requests. You can also configure the analysis to track application-specific requests

Available Views

- Server Discovery
- Graph View
- List View

Server Discovery

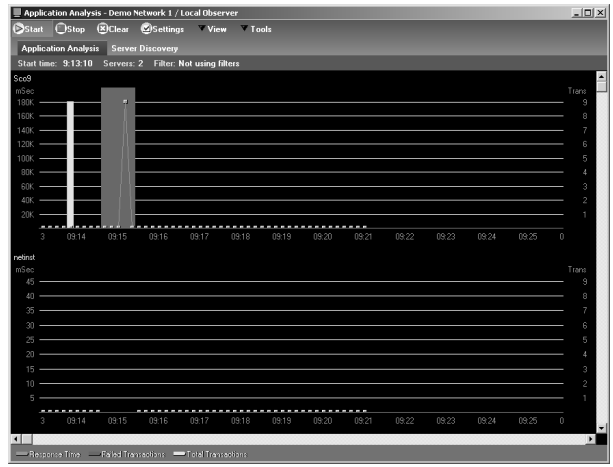
Application Analysis includes a tabbed "Server Discovery" view that scans your network and shows you active servers and any applications Observer recognizes. Click the Server Discovery tab to display the view and click the Start button to begin scanning.



Right-click any server to add its statistics to the application analysis graph and list displays. You can also start a packet capture on that address or create a filter. The Application Analysis itself has both a graph and list view, which you can select from the **View** menu.

Graph View

Application Analysis Graph view shows you transactions: total, completed, and failed:



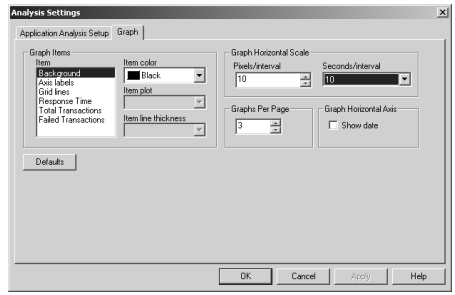
Note that if you have chosen to **Graph Specific Request** in the Application Analysis Setup dialog, only the selected type of request will be reflected in the graph.

List View

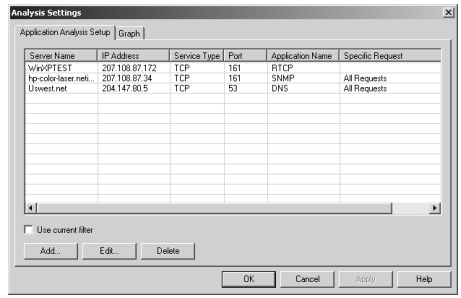
List view shows transactions in more detail. In addition to tracking total, completed, and failed transactions, List view breaks down the statistics, showing you the application-specific reasons a request failed (for example, it would show you if an FTP server is out of storage space and can't receive any more uploads).

Settings

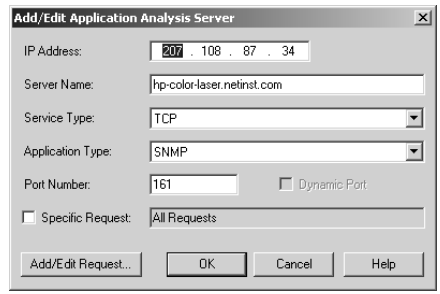
You can change the display properties of the graph (its colors, scale, etc.) by clicking the **Graph** tab on the settings dialog, which you access by clicking the **Settings** menu:



The Application Analysis setup tab lists the servers currently under analysis, letting you add, edit, or delete them.

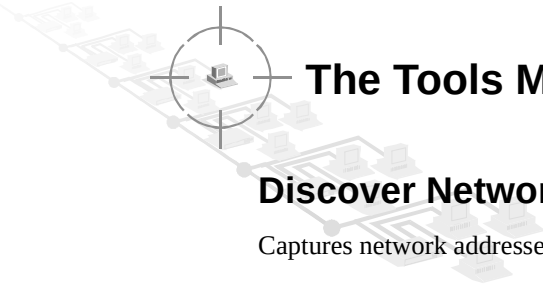


When you add or edit a server to place under Application Analysis, the following setup dialog is displayed:



Select an IP address to monitor; **Server Name** lets you uniquely name this application analysis connection. As there can be multiple connections to a given IP address (for example, when your FTP and Telnet services reside on the same machine), you might want to indicate the service being monitored in addition to the DNS name of the machine.

By checking the **Graph Specific Request** box, you will limit the completed, failed, and total transactions statistics being graphed to the type of transaction selected from the list box that becomes active when you check the box.



The Tools Menu

Discover Network Names Mode

Captures network addresses and assigns them aliases.

Menu Path

Tools->Discover Network Names

Purpose

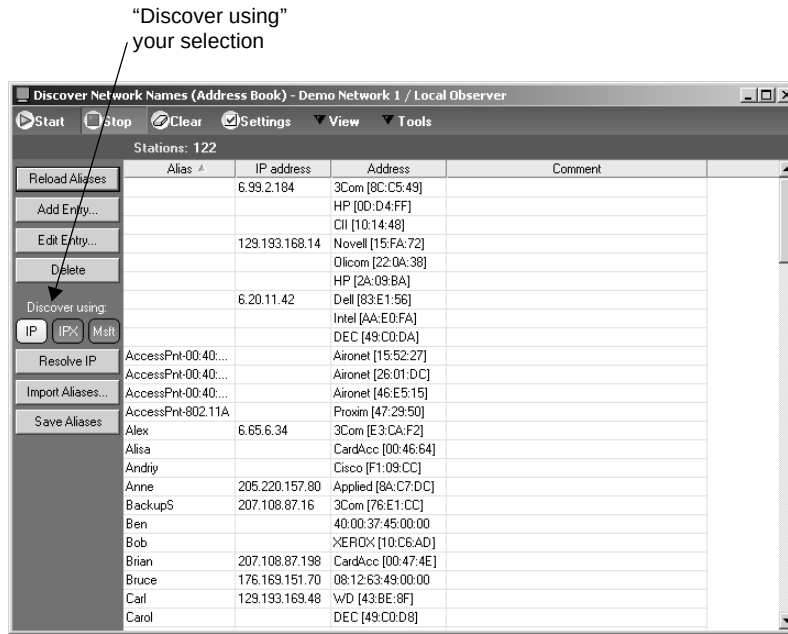
Discover Network Names mode captures all network addresses on the segment, stores them in the filter table, and assigns them aliases. You can assign a name to a network address or use the IP address, DNS name, NetWare login name, or Microsoft network login name. After storing the network names, you can use the stored names in all your queries. If you cannot directly discover a group of network names, Observer also allows you to import an address list into the Address Table.

Available Views

- Graphical Station List View
- List View

List View

1. To start Discover Network Names, select Tools > Discover Network Names from the main Observer menu or click on the icon on the toolbar.



2. To start discovering network names, click on the mode toolbar. Observer will begin to collect all of the active addresses on the network. Addresses will be added immediately as each station accesses the network or as each station is contacted (depending on which discovery mode you have chosen).

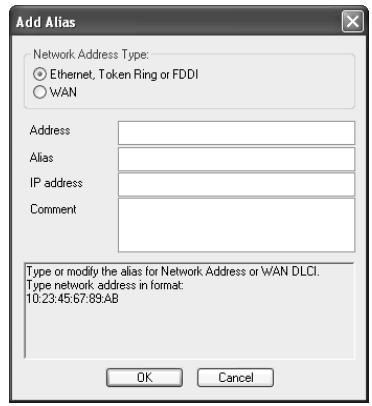
In all cases, once Discover Network Names completes its active discovery, Observer will passively "listen" to your network and record all of the addresses seen.

3. Once you have collected the addresses you are interested in saving, click on the SAVE ALIASES button. You may also highlight just a few addresses using your mouse and Shift key and save only those.

4. To reload the current alias list, click on the RELOAD ALIASES button, then click on the SAVE ALIASES button. After you confirm your choice, Observer saves the alias list.

Add Alias

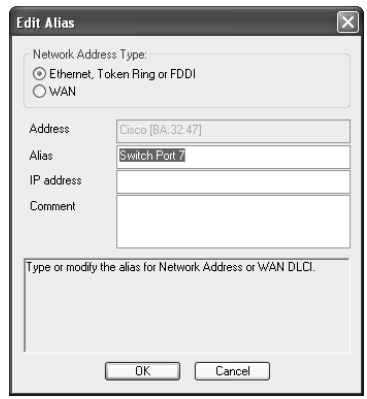
1. To add an alias, click on the **Add Entry** button. The **Add Alias** dialog will be displayed.



2. Select an Address Type.
3. Enter your Address, Alias, IP address, and any comments, then click on the OK button.

Edit Alias

1. To edit an alias, click on the **Edit Alias** button. The **Edit Alias** dialog will be displayed.

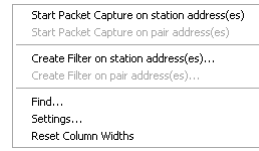


2. Select an address type. Click on the **Ethernet, Token Ring, or FDDI** option button or the **WAN** button.

Delete Alias

1. To delete an alias, click on the **Delete Alias** button. After you confirm the deletion, the alias is deleted.

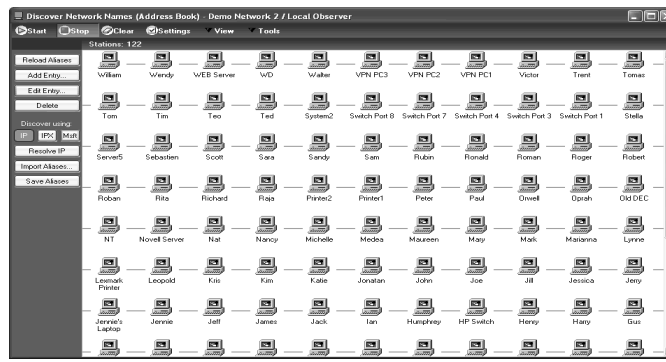
Right-Click Menu



- Start Packet Capture on station address(es)—activates the Filters dialog.
- Start Packet Capture on pair address(es)—activates the Filters dialog.
- Create Filter on station address(es)—activates the Filters dialog.
- Create Filter on pair address(es)—activates the Filters dialog.
- Find—displays the Find dialog.
- Settings—displays the Settings dialog.

Graphical Station List View

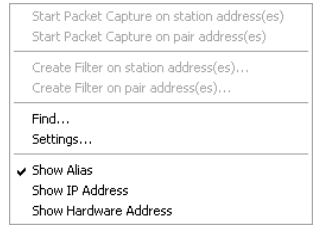
To discover network names, follow the steps listed in Discover Network Names – Graphical Station List View. see “List View” on page 198.



- To view the alias name, right-click anywhere in the display area and select “Show Alias.”
- To view the IP address, right-click anywhere in the display area and select “Show IP Address.”
- To view the hardware address, right-click anywhere in the display area and select “Show Hardware Address.”

> If there is no alias name, the IP address will be displayed. If there is no IP address, the MAC address will be displayed.

Right-Click Menu



- Start Packet Capture on station address(es)—activates the Filters dialog.
- Start Packet Capture on pair address(es)—activates the Filters dialog.
- Create Filter on station address(es)—activates the Filters dialog.
- Create Filter on pair address(es)—activates the Filters dialog.
- Find—displays the Find dialog.
- Settings—displays the Settings dialog.
- Show Alias—displays the station's alias name.
- Show IP Address—displays the station's IP address.
- Show Hardware Address—displays the station's hardware address.

Discover Using: Selections

Observer's Discover Network Names will auto-alias network addresses that it finds in three possible ways: IP, IPX, or Microsoft (Msft). Each of these methods has specific configuration options. Configuration of each method is done by first clicking the protocol option (i.e., IP, IPX, or MSFT) button, and then clicking the SETUP icon on the Discover Network Names toolbar.

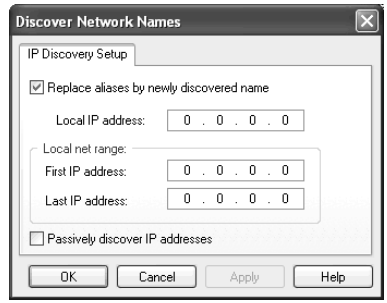
The default mode is IP. In this mode, Observer will first try to ARP all of the addresses in the IP address range given in the IP configuration twice, and then listen for any additional hard addresses that may show up over time.

IP Discovery Setup

In this dialog you specify the range of IP addresses that you would like Discover Network Names to find. You need to enter your local IP address (in the setup) for packet formation purposes.

Discover Network Names finds IP addresses by sending two ARPs to each address within the specified range, then listens passively for any new IP addresses that may show up on the network.

Click on the IP button to display the setup options.



- "Replace aliases by newly discovered name" checkbox—allows you to replace any previously entered aliases with the newly discovered names.
- "Local IP address" integer textbox—allows you to enter the IP address of your station.

Local net range:

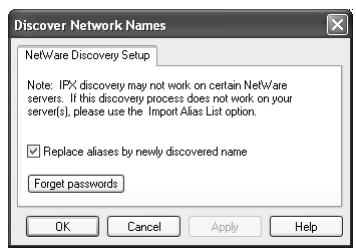
- "First IP address" integer textbox—allows you to enter the first IP address in a range.
- "Last IP address" integer textbox—allows you to enter the last IP address in a range.
- "Passively discover IP addresses" checkbox—allows you to skip the ARP part of discovery and only listen for IP packets, recording each new IP address as it is found. This is the recommended mode for FDDI.

> When using IP discovery in non-passive mode, Observer sends two ARP packets per address within the first few seconds of discovery. This will cause quite a bit of traffic for the first few seconds of discovery.

IPX Discovery Setup

Observer queries any local NetWare servers and asks the server for a NetWare login name for each hard address found on the local segment. This is done by creating IPX packets and logging into the server as administrator. You will be prompted for a NetWare administrator password before Observer begins to poll the server.

Click on the IPX button to display the setup options.

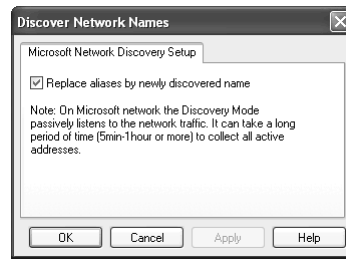

Discover Network Names
NetWare Discovery Setup
Note: IPX discovery may not work on certain NetWare servers. If this discovery process does not work on your server(s), please use the Import Alias List option.
Replace aliases by newly discovered name
Forget passwords
OK
Cancel
Apply
Help

- “Replace aliases by newly discovered name” checkbox—allows you to replace existing aliases with a newly discovered name.
- Forget passwords button—allows you to select if you would like Observer to forget your NetWare login password for the next time you resolve names.

Msft (Microsoft) Configuration

Observer is passively listening to packets in this mode and will only find the NetBIOS/NetBEUI names as they are broadcast on the network. To alias all of the names on a network may take anywhere from five minutes to many hours.

Click on the MSFT button or the **Settings** button to display the setup options.


Discover Network Names
Microsoft Network Discovery Setup
Replace aliases by newly discovered name
Note: On Microsoft network the Discovery Mode passively listens to the network traffic. It can take a long period of time (5min-1hour or more) to collect all active addresses.
OK
Cancel
Apply
Help

- “Replace aliases by newly discovered name” checkbox—allows you to specify whether you want Observer to replace existing aliases with a newly discovered name.

Resolve IP

> Once you have resolved an alias list, you cannot do a “Save As” to save it as another name. Saving an alias after you resolve aliases will only overwrite your current alias list and will not create a new one.
>
> Before running your discovery, you can select which address table you wish to be working in. If you do not have multiple address tables set up, you can add a new one. see “Multiple Address Tables” on page 204.

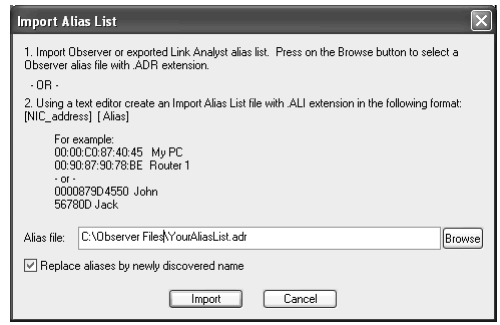
1. To resolve IP addresses into DNS names, click the RESOLVE IP button. The screen will refresh with available DNS names displayed.
2. Click on the SAVE ALIAS button. After you confirm the save, the alias list is saved and will be available for use in other Observer modes.

Import Aliases

If you cannot automatically discover your network names, Observer offers an alternative to the autodiscovery process—the Import Aliases process. This allows you to import two types of Address/Alias maps:

- the binary file format used and created by Network Instruments Observer and Link Analyst programs (these have a .adr filename extension)

- an ASCII (text) file that contains line entries for each MAC Address entry (these files must have a .ali filename extension)


Import Alias List
1. Import Observer or exported Link Analyst alias list. Press on the Browse button to select a Observer alias file with .ADR extension.
- OR -
2. Using a text editor create an Import Alias List file with .ALI extension in the following format: [NIC_address] [Alias]
For example:
00:00:C0:87:40:45 My PC
00:90:87:90:78:BE Router 1
- or -
0000879D4550 John
56780D Jack
Alias file:
C:\Observer Files\YourAliasList.adr
Browse
Replace aliases by newly discovered name
Import
Cancel

The format of address entries in a .ali file is

MACaddress, IP, alias

where MACaddress is the MAC address, *IP* is the Internet Protocol dot address, and alias is the alias by which you want the system to be known. Note that entries are separated by commas. If you want to specify a MAC Address/Alias pair without an IP, the format is:

MACaddress, , alias

Note the two commas separated by a space. You can specify the MAC address with or with out colons, as long as the format is consistent within the .ali file. Leading zeros are allowed but not required. For example

00:00:C0:87:49:45, 168.0.0.1, router1
00:00:C0:13:4B:33, 223.188.11.3, Sue's Accounting PC

-or-

0000C08B4194, 175.203.57. 8, John
C0134B33 Roman

The alias can be no longer than 17 characters.

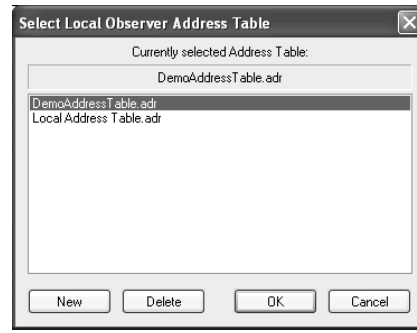
The "Replace aliases with newly discovered name" option will replace any existing MAC address/alias pairs in the Address Table with the entry found in the .ali file. If this option is left unchecked, any pair of existing MAC address/alias entries are not overwritten. Existing IP address and comment fields are never overwritten by the Import Aliases action.

Multiple Address Tables

Multiple address tables are supported to allow the saving and reuse of different address/alias lists (e.g., for multiple sites). The default address table,

LocalAddressTable.adr, is stored in the LocalAddressTable directory under the Observer installation directory.

1. You can add a new address table by selecting Tools > Select Address Table for Local Observer or by clicking on the icon on the Observer toolbar. The **Select Local Observer Address Table** dialog will be displayed.



2. To create a new address table, click on the NEW button. The **New Local Observer Address Table** dialog will be displayed.

3. Type in the name you wish the address list to refer to and click on the OK button. You will be taken back to the **Select Local Observer Address List** dialog where you click on the OK button.

Ping/Trace Route

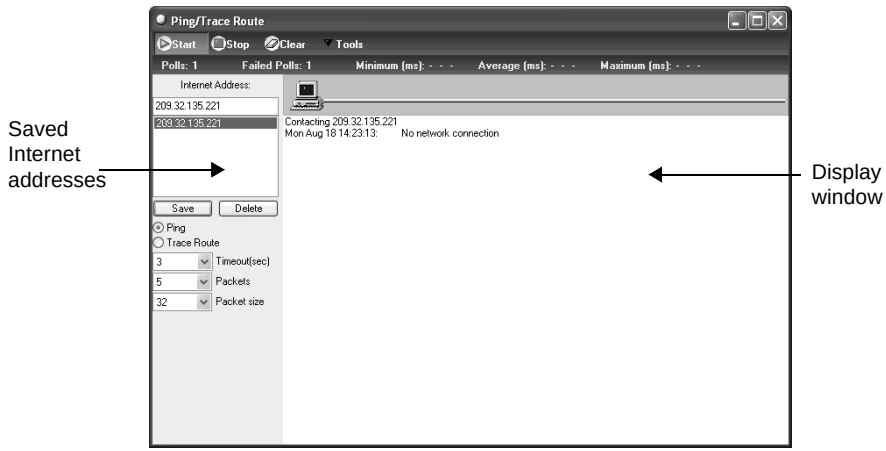
A flexible Ping/Trace Route utility.

Menu Path

Tools->Ping/Trace Route

Purpose

Observer's Ping/Trace Route permits the user to see if specific stations on an IP network are active and to trace a route from the Observer (or Probe) PC to a selected station. To open Ping/Trace Route, select Tools > Ping/Trace Route.



- "Internet Address" textbox—allows you to specify the Internet address to ping, or the address to which the route will be traced.
- Save button—allows you to save the present Internet address.
- Delete button—selecting an address in the saved addresses box and clicking this button allows you to delete the address from the saved addresses.
- Ping option button—allows you to select the Internet address to ping and the results to be displayed in the main Ping/Trace Route display area.

  To "ping" an address is to send out an "ICMP echo request" to that address. If the station is operating normally, it will respond—unless it is behind a firewall that prevents such response.

- Trace Route option button—allows you to select a route from the Observer personal computer to the specified Internet address to be traced.
- "Timeout(sec)" dropdown—allows you to specify the number of seconds that Observer will wait for a response before assuming that the packet Observer sent was either not received or not responded to.
- "Packets" dropdown—if the Ping option button is selected this dropdown box specifies the number of "ping" packets, or ICMP echo requests, that will be sent. When the Trace Route option button is selected, this option has no effect and will be grayed out.

- “Packet size” dropdown—if the Ping option button is selected, this edit box selects the number of “ping” packets, or ICMP echo requests, that will be sent. When the Trace Route option button is selected, this option will not be activated.
- Display Window—displays the results of the ping or trace.

Replay Packet Buffer

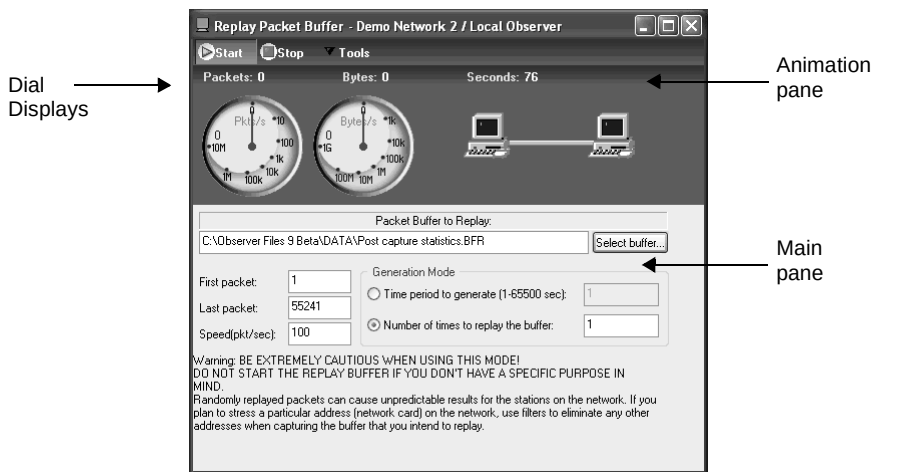
Allows you to generate traffic on the network from a previously saved capture file.

Menu Path

Tools->Replay Packet Buffer

Purpose

Replay Packet Buffer mode, like Traffic Generator mode, permits the user to create traffic on the network. Unlike Traffic Generator; however, Replay Packet Buffer mode sends some or all of a previously saved capture buffer onto the network. To begin Replay Packet, select Tools > Replay Packet Buffer.


Dial
Displays
Replay Packet Buffer - Demo Network 2 / Local Observer
Start
Stop
Tools
Packets: 0
Bytes: 0
Seconds: 76
Animation
pane
Packet Buffer to Replay:
C:\Observer Files 9 Beta\DATA\Post capture statistics.BFR
Select buffer...
Main
pane
First packet:
1
Last packet:
55241
Speed(pkt/sec):
100
Generation Mode
Time period to generate (1-65500 sec):
Number of times to replay the buffer:
Warning: BE EXTREMELY CAUTIOUS WHEN USING THIS MODE!
DO NOT START THE REPLAY BUFFER IF YOU DON'T HAVE A SPECIFIC PURPOSE IN MIND.
Randomly replayed packets can cause unpredictable results for the stations on the network. If you plan to stress a particular address (network card) on the network, use filters to eliminate any other addresses when capturing the buffer that you intend to replay.

- Dial displays—the left dial displays the speed (packets per second) of the buffer as it is being replayed. The right dial displays the speed (bytes per second) of the buffer as it is being replayed.

Totals pane:

- This pane displays totals for the replay: the number of packets transmitted, the number of bytes transmitted, and the number of seconds that the replay buffer has been transmitted.
- Animation pane—while the transmission is occurring this display will be animated.

Main pane:

- “Select buffer” textbox and button—allows you to enter the name of the buffer (.BFR) file to be transmitted. Enter the name and address of the file to be transmitted or click the Select buffer button to browse to it.
- “First packet” textbox—allows you to set the number of the first packet in the buffer to be transmitted.
- “Last packet” textbox—allows you to select the number of the last packet in the buffer to be transmitted.
- “Speed (pkt/sec)” textbox—allows you to set the speed, in packets per second, which you would like to attempt to transmit the buffer.

If the speed is set at a higher number than the Observer computer’s NIC card is capable of, it will only be able to transmit the buffer at the NIC card’s maximum rate.

Generation Mode:

- “Time period to generate (1-65500 sec)” option button and textbox—if selected, packets will be generated at the configured speed for the number of seconds specified in the edit box. If the specified contents of the buffer are completely transmitted before the end of that time period, the transmission will loop back to the first packet as chosen above.

If you select this option button, the textbox will be active.

- “Number of times to replay this buffer” option button and textbox—if this option button is selected, the buffer file, or the selected portion of it, will be replayed the number of times specified in the edit box.

If you select this option button, the textbox will be active.

SNMP Trending Data Manager

The SNMP Trending Data Manager provides a convenient method of browsing and pruning SNMP trending data. It shows you what data is available, how much space it is taking up, and offers a couple of options for conserving space:

- Erasing the trending data does just that; both processed trending data and the raw poll data that it was derived from are deleted and will no longer be available in the Trend Viewer.
- Processing and removing raw trending data erases only the raw poll data, after the averages have been processed and saved for the trending viewer. You'll still be able to see aggregate trending data in the viewer, but you will not be able to zoom in on the raw polling data once it has been removed.

The SNMP Trending Data Manager also allows you to delete log files.

SNMP MIB Editor

See “The MIB Editor” on page 352.

SNMP MIB Walker

Lets you walk a MIB to determine what objects it contains.

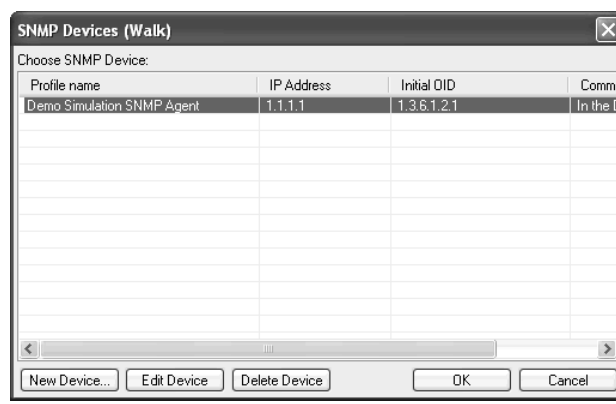
Menu Path

Tools->SNMP MIB Walker

Purpose

The MIB Walker automatically browses through the hierarchy of an SNMP Management Information Base (MIB) and displays what objects it contains.

To open SNMP MIB Walker, select Tools > SNMP MIB Walker. If this is the first time you have run the mode, the setup screen is displayed, which allows you to select and configure MIB Walker profiles:.

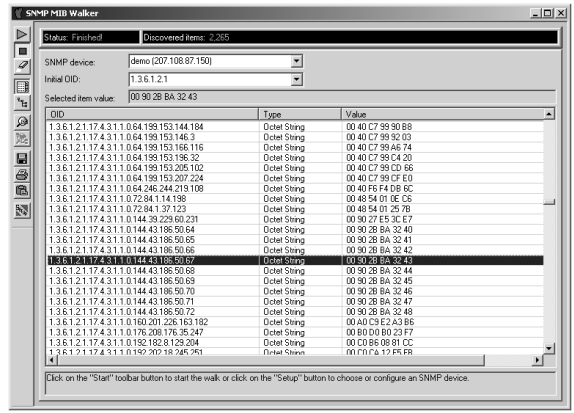


Select a device or click **New Device...** to configure a new device. The MIB walker profile creation dialog includes the following controls:

- Profile name--choose a name that is descriptive enough to be meaningful to you later.
- “IP Address” textbox—allows you to enter the IP address to be used for the profile.
- “Community” textbox—allows you to enter the community for the profile (public or private).
- “SNMP version” dropdown—allows you to select the SNMP version.
- “Initial OID” textbox—allows you to enter the initial OID.
- “Comment” textbox—allows you to enter comments regarding this walk.

- The “Choose existing SNMP devices...” button allows you to pick an SNMP device to create a MIB profile from a list of SNMP devices that have already been defined in or discovered by Observer.

After you have a profile (or a number of profiles) defined, the SNMP MIB walker looks like this:.



1. Select a MIB Walker profile.
2. By default, the initial OID for the walk will be 1.3.6.1.4.1. If you prefer to have your MIB walk begin from another OID, enter it in the “Initial OID” textbox or use the dropdown arrow if you've recently used another starting point.

   1.3.6.1.4.1 is the “root” of the proprietary part of the MIB tree. A walk from 1.3.6.1.4.1 will give you information on the proprietary OIDs. To get information from the standard OIDs, start the walk at 1.3.6.1.2.1.
3. Click the **Start** button to start.
4. SNMP Extension’s MIB Walker will step through all higher branches of the MIB tree (starting at the initial OID) and display the results in the Walk Network Device MIB Table Viewer.

The following buttons are active from the Walk Agent MIB Table Viewer after the walk has been completed:

- **Print** button -allows you to send the table to a user-chosen printer.
- **Save List** button -allows you to save the table to a user-chosen text file.
- **View Tree** or **View List** button-allows you to switch between Tree View and List View.
- **Identify Nodes** button-allows you to identify the walked nodes using a user-chosen MIB file.

Viewing the MIB Tree

Selecting the View Tree button from the Walk Agent MIB dialog displays the Walk Agent MIB Tree Viewer. The Walk Agent MIB Tree Viewer displays the structure, although not the values, of the discovered MIB tree.

Setting Values

One of the main uses of the MIB Walker and the Walk Agent List Viewer is to permit you to explore the SNMP agent by setting values to see what effect different values have on the actual device and to be sure that objects are writable.

1. To set a value, select any object on the Walk Agent List Viewer and click on the Set Value button. The Set Value dialog will be displayed. Before attempting to make any changes, note the present value, so that you can restore the device to its original state.
2. Enter an appropriate real or test value into the Value textbox.
3. Click the Set Value button. SNMP Extension will attempt to set the given OID to the entered value.
4. If the attempt to set the value succeeds, the dialog box will be redisplayed with the Status line reading “Done.”

   Be careful to use the proper type of value when setting the value. If you attempt to set an integer SNMP value to a character string (e.g., “Bob”) it will be set to zero.

5. If the attempt to set the value fails, an error dialog will be displayed, and the Status line on the Set Value dialog box will read “Failed” instead of “Done.”

Failure can happen for one or both of two reasons:

- the MIB object you are attempting to set is Read-Only and cannot be reset
- you do not have the proper read-write community name for this device.

Switch Station Locator

Shows MAC addresses of devices connected to switches on the Network.

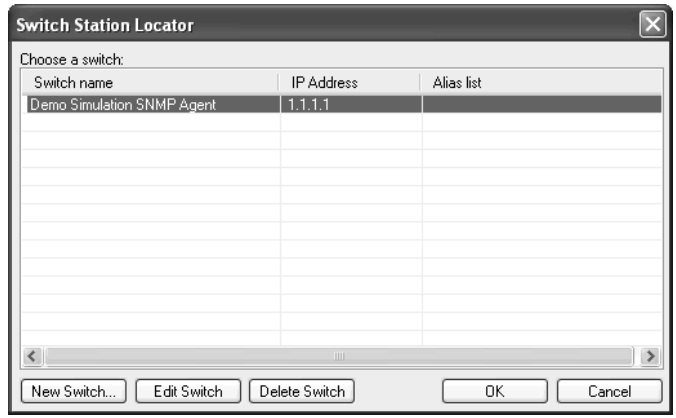
Menu Path

Tools->Switch Station Locator

Purpose

Select this option from the Tools menu to view the MAC addresses of devices connected to switches on the network. The Switch Station Locator uses SNMP queries to determine the MAC addresses of all the stations attached to each switch that you set up.

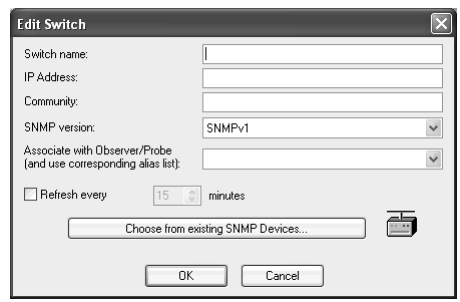
When you start the locator, you must first choose a switch to query. A dialog appears listing the currently configured switches:



If this is the first time you have used the Switch Station Locator, you must configure a switch with the **New Switch...** button to make it appear in the list of switches. The section below describes this dialog.

Setting up and Selecting A Switch for the Locator

When you click the **New Switch...** button, the **Edit Switch** dialog is displayed:



Enter the following information to set up a switch:

- “Switch Name” text box—Enter a name by which you want the switch to be listed in the Switch Selection list.
- “IP Address” text box—Enter the IP Address of the switch on which you want to locate stations.

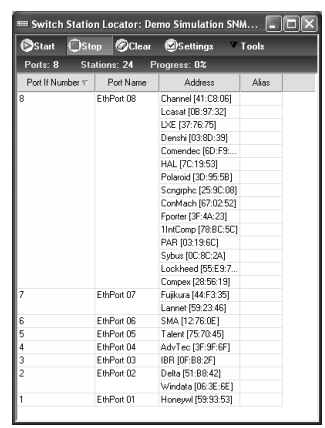
- “Community” text box—Enter the IP community of the switch on which you want to locate stations. Note that this string is case sensitive.
- “SNMP Version” dropdown box—Make sure that you match this entry to the version SNMP running on the switch.
- “Use Alias List” dropdown box—Choose either “no alias list” or a local Observer (or Remote Probe) alias lookup table to display the alias in addition to the MAC address for each station found.
- “Refresh every xxxx minutes” checkbox/spinbox:—Checking this option causes the Switch Station Locator to repeat the station query every given number of minutes (from 0-9999)
- “Choose from Existing SNMP devices...” button—Click this button to display a list of SNMP-configured switches recognized on your network. Double-click the desired switch to auto-fill the Edit Switch dialog with that switch's configuration parameters.
- “OK” button—Save the settings and return to the Switch Station Locator switch selection window.
- “Cancel” button—Abandon the changes and return to the Switch Station Locator switch selection window.

Editing a Switch in the Selection List

You can change any of the properties listed above for a listed switch by highlighting that switch and clicking the **Edit Switch** button.

The Switch Station Locator Monitor Window

Once you have added all of the new switches you want to query, double-click on one of the listed switches to display the Switch Station Monitor window, which displays the switch being queried in the window title, and shows the following information about stations attached to the switch:



- Port If Number—The SNMP Port Interface number for the station
- Port Name—The name of the port connected to the station.
- Address—The MAC address of the station.
- Alias—The alias of the station, if you have chosen to use an alias list (see Setting Up and Selecting a Switch for the Locator above).

You can sort the display by a particular field by clicking on the column heading for that field. You can select which fields you want to display by right-clicking on any of the column headings.

Switch Station Locator Setup

The Setup button to the left of the display lets you specify whether you want the monitor window to clear after every poll (the default), or to accumulate switch listing until you manually clear the display with the Eraser button on the toolbar.

Traffic Generator

Generates packets to test the network.

Menu Path

Tools->Traffic Generator

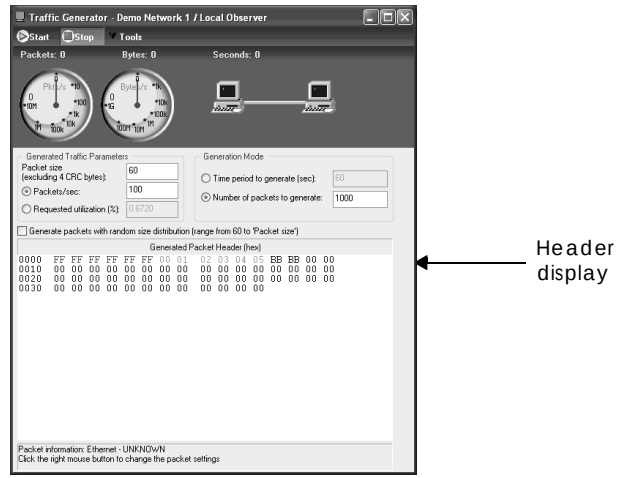
Purpose

Traffic Generator is the tool in which Observer can generate a user-chosen number of configurable packets to test the network's performance. Sometimes a network problem only shows up under peak load conditions. Traffic Generator allows you to stress your network by generating generic broadcast traffic, source or destination specific generic traffic, or protocol specific traffic for stressing a specific device or group of devices.

> **Caution:** Be careful when generating traffic. Generating **too** much traffic can slow down the network. You may of course **want** to stress test your network by using the Traffic Generator to simulate a heavy load (which is just one of the many uses of the Traffic Generator). Just be aware of what you are doing, and perhaps notify your users of possible downtime.
>
> To use the Traffic Generator in this manner, the NIC must be capable of generating sufficient traffic to heavily load the network. For example, a 10 megabit NIC card simply can't use more than 10% of a 100 megabit network's bandwidth.

Traffic Generator is available in List View.

You can display the **Traffic Generator** dialog in Observer by selecting Tools > Traffic Generator.


Traffic Generator - Demo Network 1 / Local Observer
Start
Stop
Tools
Packets: 0
Bytes: 0
Seconds: 0
Generated Traffic Parameters
Packet size (excluding 4 CRC bytes):
60
Packets/sec:
100
Requested utilization (%):
0.6720
Generation Mode
Time period to generate (sec):
60
Number of packets to generate:
1000
Generate packets with random size distribution (range from 60 to 'Packet size')
Generated Packet Header (hex)
0000 FF FF FF FF FF FF 00 01 02 03 04 05 BB BB 00 00
0010 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0020 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0030 00 00 00 00 00 00 00 00 00 00 00 00
Packet information: Ethernet - UNKNOWN
Click the right mouse button to change the packet settings
Header display

- "Packet size" textbox—allows you to define the size of the packets that will be generated. Allowable values are from 64 (bytes) to 1514 for Ethernet and from 64 (bytes) to 4096 for Token Ring.
- "Packets/sec" textbox—allows you to define the number of packets that Observer or the Probe will generate per second.
- "Time period to generate (1-65550 sec)" option button and textbox—allows you to define the amount of time Observer or Probe will generate packets in seconds; the textbox is only active once you have checked the option button.
- "Number of packets to generate" option button and textbox—allows you to define the number of packets Observer will send; the textbox is only active once you have checked the option button.

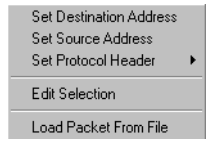
You can specify a destination address and/or a source address. These will be displayed in the header display. The address list is compiled from your filters table, with the addition of the "Local" address and a "Broadcast" address.

- "Generate packets with random size distribution (range from 64 to 'Packet size')" checkbox—allows you to specify the type of packet that Observer will generate. By default, Observer will generate generic broadcast packets, but you can specify IP, TCP, UDP, or IPX and Observer will form packets with the corresponding headers.

When generating traffic it is best to view the generated traffic as well as the results of the traffic generation from a separate Observer station than the one that is generating the traffic.

Note: You can edit the packet header string that the Traffic Generator transmits. Simply highlight the hexadecimal codes you want to change, right click and select Edit Selection... from the popup menu.

Traffic Generator Right-Click Menu



- Set Destination Address—displays the Select Address dialog.
- Set Source Address—displays the Select Address dialog.
- Set Protocol Header—allows you to choose from one of the following: IP, IPX, or Default.
- Edit Selection—allows you to edit your selection.
- Load Packet From File—displays the Load Packet dialog.

Enterprise Licensing

Lets you activate and monitor enterprise licenses (if you have purchased such licensing).

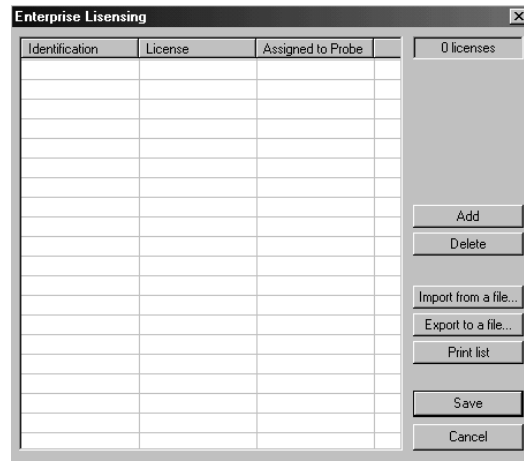
Menu Path

Tools->Enterprise Licensing

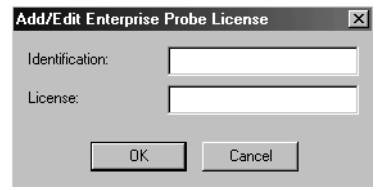
Purpose

Enterprise licensing allows you to keep track of the Observer licenses and identification numbers in your organization. To activate Enterprise Licensing, you must obtain a special license code from your Network Instruments representatives (see the back cover of this manual for contact information). Until you enter this code in the License Observer dialog (available on the File menu), the Enterprise Licensing option will be disabled. Once

you've entered the code, click **Tools -> Enterprise Licensing** to display the Enterprise Licensing dialog:



- Identification—displays the Observer identification number.
- License—displays the Observer license number.
- Assigned to Probe—displays the Probe the license number and identification number are assigned to.
- Add button—displays the Add/Edit Enterprise Probe License dialog.



  - "Identification" textbox—allows you to add an identification number.
  - "License" textbox—allows you to add a license number.
- Delete button—allows you to delete a license or an identification number.
- Import from a file button—allows you to import the numbers from a file.
- Export to a file button—allows you to export the numbers to a file.
- Print list button—allows you to print the list of numbers.

Edit Switch Scripts

Edit Telnet Switch Script File

see "Telnet Scripts" on page 312.

see “SNMP Scripts” on page 319.

Define Protocols for Protocol Distribution Statistics

See “Settings” on page 114.

Import/Export Filters

This option lets you save filters (See “Filter Setup for Selected Probe” on page 219.) that you have created with **Filter Setup for Selected Probe...** or load filter rules that have been sent to you by another Observer user.

Each filter file can store multiple filters. A checklist of filters available for import or export is displayed, allowing you to select the desired filters for import or export.

Register Custom Decode DLLs

Lets you integrate custom-written decode applications into the Observer environment.

Menu Path

Tools->Register Custom Decode

Purpose

Observer allows you to write your own protocol decoder, assuming that you have expert knowledge in the following:

- The protocol you are writing the decoder for
- The C++ Programming Language

In addition, it helps if you have Microsoft C++ Developer's Studio, as Network Instruments has included an example project file for that environment along with the example source code. The Custom Decode Kit is contained in the Observer Files\Drivers\CustomDecodeKit directory (**CustomDecodeKit.exe**, which is a self-extracting archive). Along with the example project and source files, the Kit also includes an Acrobat PDF file that outlines the steps in building a DLL.

Once you have built a DLL and placed it in the Observer FIles directory, select Register Custom DLL from the Tools menu and add the new DLL to the list of registered DLLs. Once a DLL has been registered, the new decode will be available in the Decode and Analysis tree control.

Switch Setup Dashboard

see “Main Switch Dashboard – Switch Setup Tab” on page 309.

Select Address Table for Local Observer

see “Multiple Address Tables” on page 204.

Filter Setup for Selected Probe

Lets you filter which packets to capture by applying various criteria.

Menu Path

Tools->Filter Setup for Selected Probe

Purpose

Packet filtering lets you configure Observer to discard the packets you are not interested in so that you can focus on the traffic you are interested in. Without filtering, it can be much more difficult to find the packets that will help you solve a problem or focus on problematic network stations and devices.

Filters consist of **rules** that cause a packet to be included or excluded during packet captures and certain statistical modes. Each rule is a condition test applied to each packet sensed. Depending on the type of network you are analyzing, you can test for over a dozen types of conditions, including:

- sending and receiving addresses (MAC, IP, DLCI)
- which protocol packets are part of
- whether packets include a particular ASCII, hex, or bit string starting from a specified offset
- whether packets include a particular numeric value at a specified offset

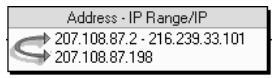
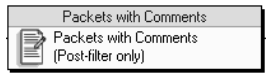
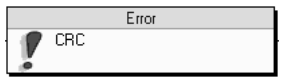
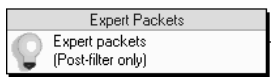
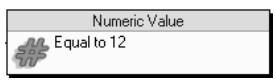
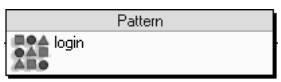
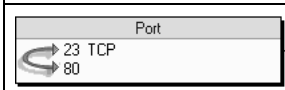
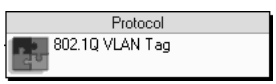
You can either include or exclude packets based on the results returned for each packet by each rule in the filter.

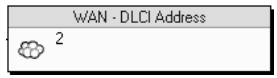
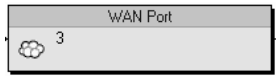
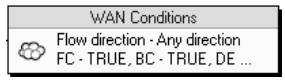
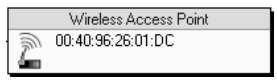
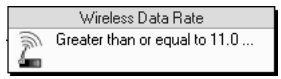
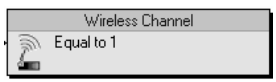
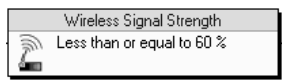
Types of Filter Rules

As noted, there are a number of different rule types. Note that not all rule types (WAN and Wireless) apply to all network types, and others only apply to post-capture filtering (for example, rules that filter for packets that have been annotated with Observer or Expert packets generated by Observer).

If you apply a rule that is not relevant to the current capture or post capture filter scenario, that rule is ignored.

The table below lists all the rule types and setup options. A setup dialog is displayed when you first create a rule; you can edit a rule by double-clicking its icon in the Filter Setup rule editor. Detailed setup descriptions follow the table.

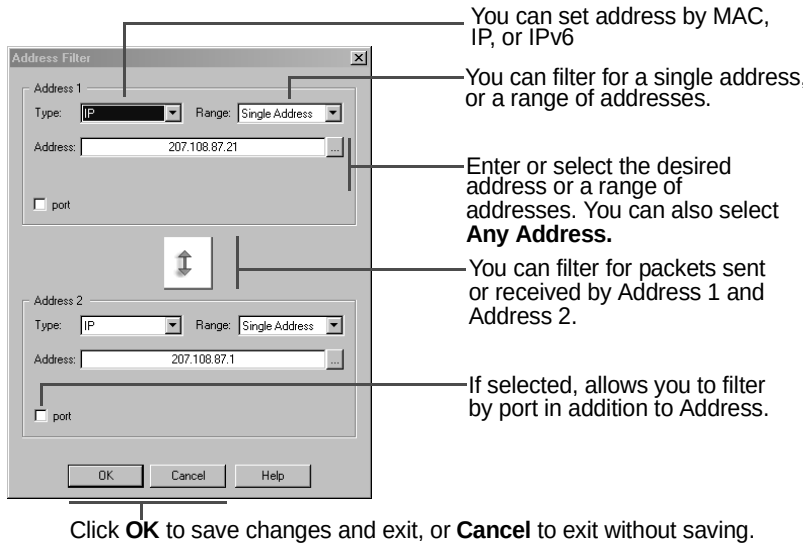
Rule Type	Usage
	Specify a hardware or IP address or range of addresses for source and destination. You can also limit the rule to apply only to packets from particular source or destination ports.
	Filter for packets that have been commented by an Observer user and saved with a capture file. Comments are useful for annotating packets when two analysts are working on a problem together, perhaps sending each other captures from remote sites on a corporate network. There are no setup options. Available for post-filter only.
	Specify the categories of errors you want to filter for: **CRC**, **Alignment**, **packet to small**, and **packet too large** are available for all network types. You can also filter for **Wireless WEP errors** if you are analyzing a wireless network. If you are analyzing a WAN link, you can filter for **WAN abort** and **RBIT** errors. Observer also lets you filter for Token Ring error notifications when analyzing Token Ring networks.
	This rule lets you filter for Observer-generated Expert packets. These packets will only be generated if the “Include Expert Load information packets” box has been checked in **Mode Commands > Setup for Packet Capture**. There are no setup options. Available for post-filter only.
	Specify a packet length, and whether you want to filter for packets that are less than, equal to, or greater than that length. You can also filter for packets that fall within a range of length values.
	This rule is useful when you need to filter for a numeric value (or range of values) that is embedded within a byte, word or double word.
	Use this rule to filter an ASCII, hexadecimal, or binary string starting at specified offset or within a specified range. Hexadecimal and binary strings allow you to filter for values embedded within a particular byte, word, or double word if you know the offset, either from the beginning of the packet, or from the beginning of a particular protocol header. If you want to filter for numeric value or range of values within a byte or word, consider using the numeric value filter.
	Specify a port or range of ports for inclusion or exclusion.
	Select a protocol and field to filter on. For example, you can filter for ICMP “Destination unreachable” messages, or the presence of a VLAN tag.

Rule Type	Usage
	Specify a WAN DLCI by number.
	Specify a WAN Port by number.
	Lets you filter for direction (DCE or DTE or both), and logically chain tests for forward congestion packets, backward congestion packets, and discard eligibility.
	Enter or select a hardware address that corresponds to the wireless Access Point you wish to capture traffic from.
	Select a wireless data rate, and whether you want to filter for packets traveling at, under, or over that rate.
	Select a wireless channel, and whether you want to filter for packets received from channels less than, greater than, or equal to that channel.
	Select a wireless signal strength, and whether you want to filter for packets received at, under, or over that signal strength.

The following sections detail all the types of filter rules and their settings.

Filtering by Address

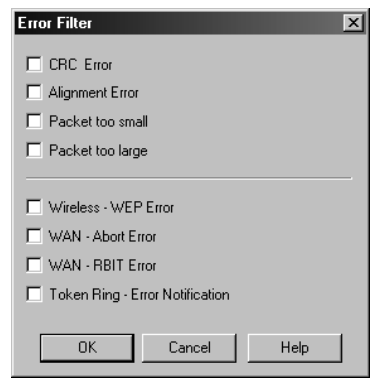
This rule lets you look at traffic by address or address pair. Setup options are described below:


You can set address by MAC, IP, or IPv6
You can filter for a single address, or a range of addresses.
Enter or select the desired address or a range of addresses. You can also select **Any Address.**
You can filter for packets sent or received by Address 1 and Address 2.
If selected, allows you to filter by port in addition to Address.
Address Filter
Address 1
Type: IP
Range: Single Address
Address: 207.108.87.21
port
Address 2
Type: IP
Range: Single Address
Address: 207.108.87.1
port
OK
Cancel
Help

Click **OK** to save changes and exit, or **Cancel** to exit without saving.

Filtering for Errors

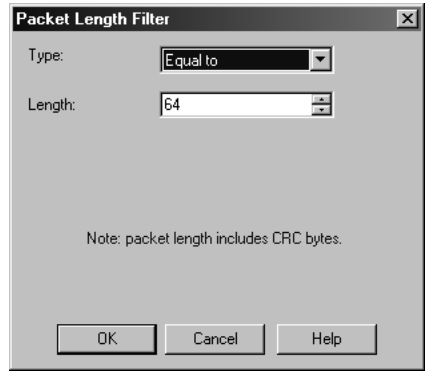
Choose which types of errors you want to filter for. When you select multiple error



conditions to filter for, the conditions are chained with logical ORs. In other worlds, if you check “CRC” and “Packet too small,” you will filter for packets that contain either of those errors in addition packets that include both.

Filtering by Packet Length

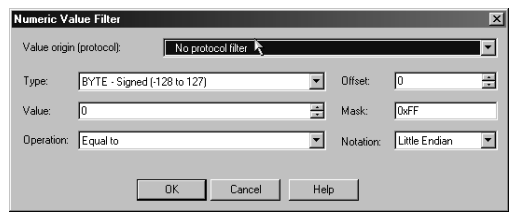
You can filter for packets that are less than, greater than, or equal to a given length in bytes



(including CRC bytes). You can also filter for a range of values, entering the minimum and maximum length of packets that you want filtered.

Filtering for Numeric Values at an offset

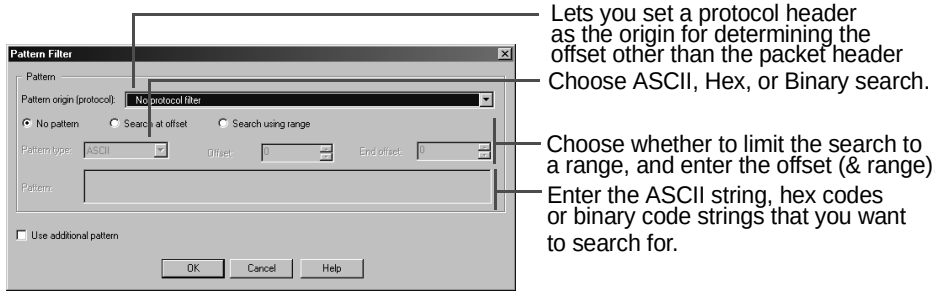
Similar to the Pattern rule described below, a Numeric Value rule lets you filter for a numeric value contained in a byte, word, or double word at a known offset, either from the beginning of the packet, or from a specified protocol header.



If the value you want to filter on is a partial byte or word, you can mask out the portion of the word you are not interested in filtering on. You also can specify the bit ordering (Little Endian or Big Endian, i.e., most significant or least significant bit first).

Filtering for a Text, Hexadecimal, or Binary Pattern

When defining a Pattern rule, you can enter a specific offset from the beginning of a


Lets you set a protocol header as the origin for determining the offset other than the packet header
Choose ASCII, Hex, or Binary search.
Choose whether to limit the search to a range, and enter the offset (& range).
Enter the ASCII string, hex codes or binary code strings that you want to search for.
Pattern Filter
Pattern
Pattern origin (protocol):
No protocol filter
No pattern
Search at offset
Search using range
Pattern type:
ASCII
Offset:
End offset:
Pattern:
Use additional pattern
OK
Cancel
Help

packet header (or from the beginning of a protocol's header), and a specific *pattern* or data sequence to search for after that offset.

The offset is the decimal position to start looking for the sequence, in the byte order you specify (Big endian or little endian, or most significant bit first or last, respectively). Enter the offset as a decimal value. If you select **Search Using Range** you can enter a ending offset beyond which the filter will not search for the pattern.

The pattern itself is the actual ASCII, Hex or Binary string that you are filtering for.

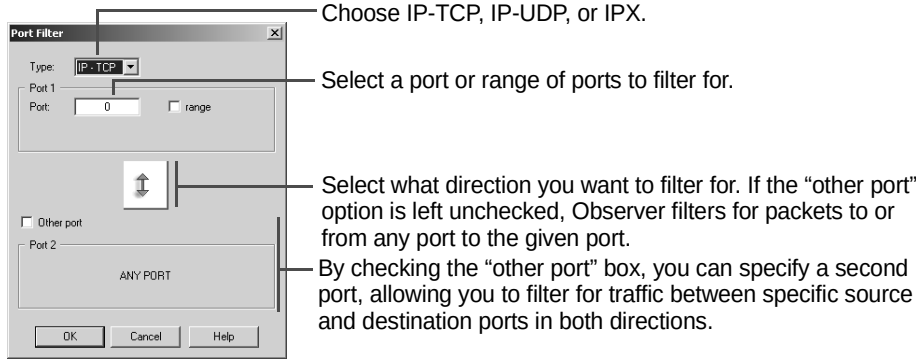
For example, to define an offset-sequencing filter to look for telnet packets (i.e., looking for TCP port 23) in one direction, the offset would be 34 (14 bytes of Ethernet header + 20 more bytes of IP header) and the hex pattern would be 00 17 (23 in hex).

To create a Pattern rule for telnet in both directions, you could first tell Observer you want to start the offset at the IP-TCP protocol portion of the header (specify IP-TCP in the "Protocol" dropdown dialog), then tell Observer that you want the first offset to start immediately (port number is the first field after the TCP header) by entering "0" in the first offset field and "00 17" in the first "Offset Filter" area. This will filter for telnet packets in the direction of source to destination. To see the telnet response packets, you should enter a second offset (in the same dialog) for offset "2" and with a value of "00 17". The second offset specifies the destination port (this is the reason for the offset of "2").

> For hexadecimal patterns, you must enter the two-character representation of each byte in the hex pattern, with a SPACE between. For the example above, telnet is on port 23, which is represented as "00 17" in hex. Note the SPACE between the "00" and the "17."
>
> For binary patterns, you must enter each byte as two 8-position bit strings separated by a space (for example,"10011101 11001100").

Filtering by Port

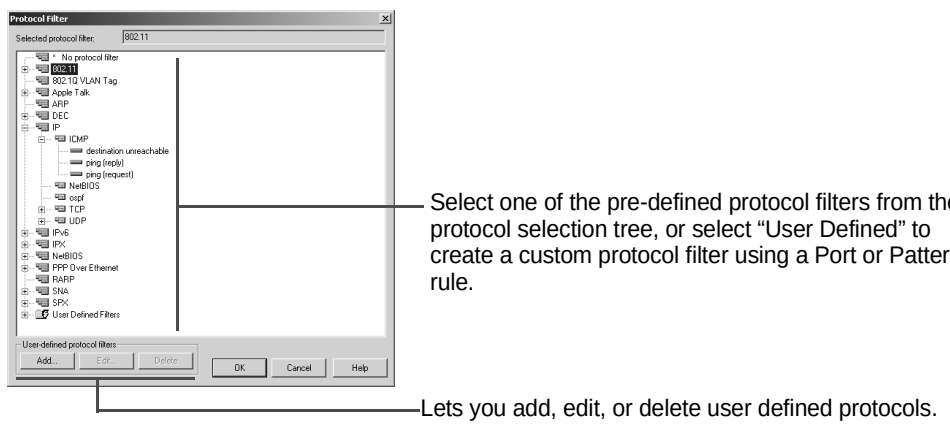
Filtering by port is useful in many different troubleshooting and security monitoring


Port Filter
Type:
IP - TCP
Port 1
Port:
0
range
Other port
Port 2
ANY PORT
OK
Cancel
Help
Choose IP-TCP, IP-UDP, or IPX.
Select a port or range of ports to filter for.
Select what direction you want to filter for. If the “other port” option is left unchecked, Observer filters for packets to or from any port to the given port.
By checking the “other port” box, you can specify a second port, allowing you to filter for traffic between specific source and destination ports in both directions.

scenarios. The Port Filter rule lets you filter by either source or destination port, or traffic moving between specific source and destination ports.

Filtering by Protocol Data fields

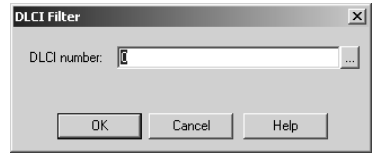
Observer’s Protocol Data Field filter rule lets you search for specific values in selected



protocol header fields. For example, you can filter for ICMP “destination unreachable” packets, as well as wireless control, data, and management packets, to name but two. You can also define your own custom protocol filter, either by port or search pattern.

Filtering by WAN DLCI

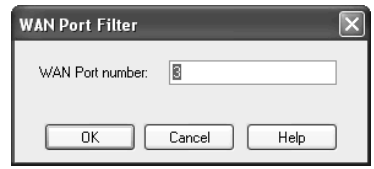
If you have deployed one of Network Instruments WAN Probes or Systems (or you are



post-filtering a packet capture obtained from such a setup), you can filter by DLCI number.

Filtering by WAN Port

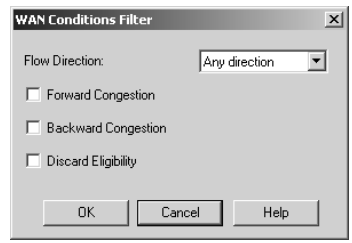
If you have deployed one of Network Instruments WAN Probes or Systems (or you are



post-filtering a packet capture obtained from such a setup), you can filter by WAN Port number.

Filtering by WAN data flow direction and congestion control packets (WAN Conditions)

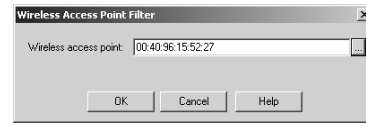
If you have deployed one of Network Instruments WAN Probes or Systems (or you are

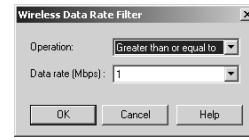


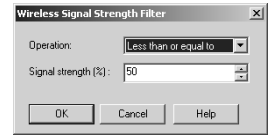
post-filtering a packet capture obtained from such a setup), you can filter by WAN data flow direction (i.e., DCE, DTE, or any direction). In addition, you can add WAN traffic management conditions to the filter rule (forward congestion, backward congestion, discard eligibility.) The conditions are chained by logical ORs. For example if you set direction to DTE and check all of the option boxes, you will filter for DTE packets that have the forward congestion, backward congestion, **or** discard eligibility bit set.

Filtering by Wireless Access Point, Data Rate, and Signal Strength

Observer includes filter rules useful for 802.11a/b/g wireless analysis, letting you filter for







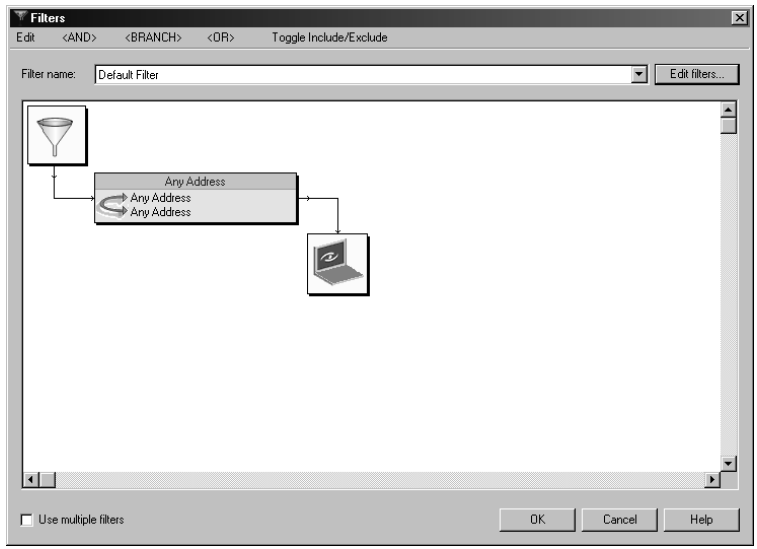
an access point, particular data rates and ranges of data rates, and signal strength.

Simple Filters (Single-rule filters)

In most cases a single-rule filter is all you need. For example, suppose user Katie is having access and performance problems with the web server. The only traffic you are interested in for troubleshooting purposes is the traffic between those two devices (Katie's machine and the intranet web server).

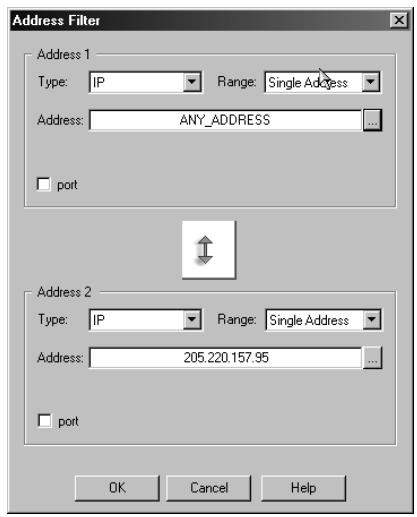
Here's how to create a simple, one-rule filter to capture that traffic:

1. Choose **Filter setup for selected Probe** from the tools menu. The Filter Editor screen is displayed, showing a blank address rule (i.e., a rule that captures all traffic on the network):

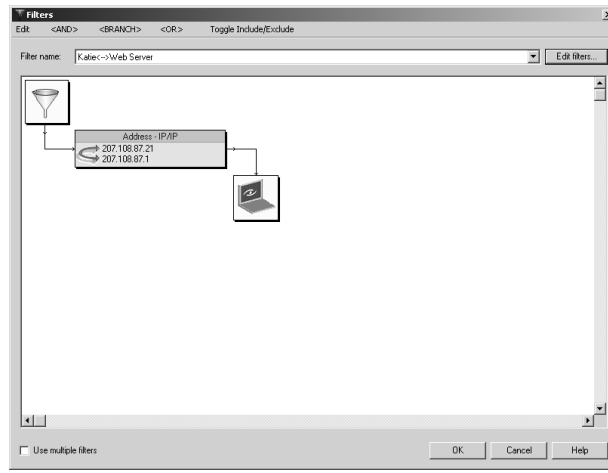


2. Select the rule by clicking on it. Note the selection color change. Right-click the rule and choose the **Edit Filter...** option. In the example, we have named the filter **Katie<->Web Server.**

3. Right-click on the address rule and choose **Edit...** from the menu. The rule's setup dialog is displayed:



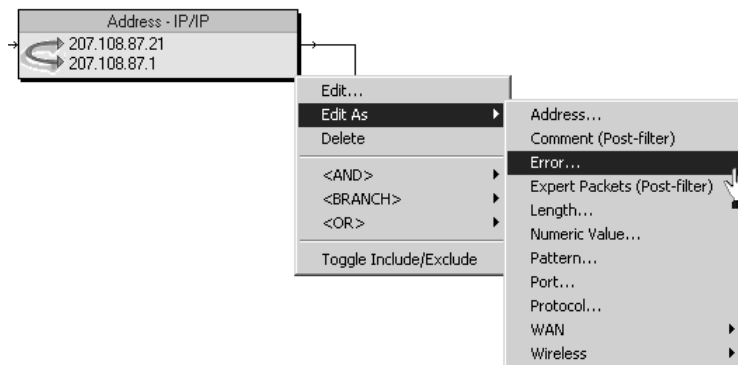
4. Choose **IP** as the address Type, and Single address as the range for both address 1 and address 2. Select (or enter) the IP addresses of the devices you are interested in monitoring from the Address drop-down list. Set the direction arrow to capture packets going both directions. Click OK to save the rule changes and close the setup dialog. The Rule Editor should now look something like this:



5. Click OK to save the filter.

Changing a Rule Type (Edit as...)

Suppose you want to filter for error packets instead of by address. To change any rule's type, right-click and choose **Edit as...** to display the list of rule types which you can choose from.



Filter Shortcuts

Most Observer displays that include station lists or decoded packets allow you to jump to the filter setup screen through the right-click menu. The filter setup screen is automatically filled in with the relevant rule set. For example, from the Discover Network Names list

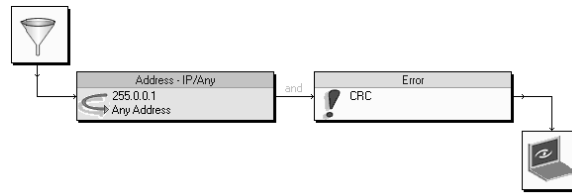
view, you can right-click to set a filter or direct a filtered capture from that station. You can set a pattern filter by right clicking on the hex pane of the decode window. From the Expert TCP and UDP Events displays, Observer Expert and Suite users can auto-create a "conversation filter" (i.e. an address and port filter) by right-clicking an event.

Chaining Multiple Filter Rules by using Logical Operators

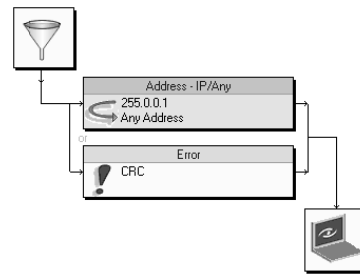
Sometimes you need more sophisticated rules to capture packets from a number of addresses that meet complex criteria.

For these kinds of situations, you can chain multiple rules together into a single filter using the logical operators AND, OR, and BRANCH. The filter rule editor arranges the rules according to where the fall logically in the decision tree that you are building when using multiple rules. Each rule is represented by a rectangle, ANDs are represented by horizontal connecting lines, ORs and BRANCHes are represented by vertical lines.

AND and OR mean exactly what you would think. For example, the following rule would cause Observer to include only CRC error packets that originate from IP 255.0.0.1 (in other words, both the address rule AND the error rule must return positive for the packet to be captured).



If you want to capture traffic from 2555.0.0.1 along with any error packets regardless of originating station, you would chain the rules with OR:

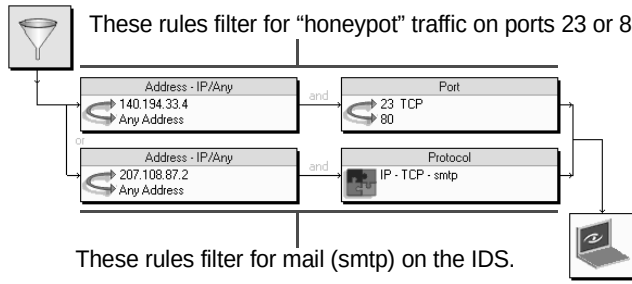


BRANCH is somewhat like an OR, but if the packet matches the first rule in the branch, it is matched only against the rules that follow on that branch.

Suppose your network includes an intrusion detection system (IDS) with a "honeypot" (i.e., a system to attract hackers so that you can monitor what they are doing). The IDS is

programmed to send mail whenever the honeypot receives packets on ports 23 or 80 from a system outside of your network.

To verify the operation of your IDS, you would want to capture any relevant traffic touching the honeypot, as well as any email traffic coming from the IDS. You are *not* interested in filtering the honeypot for email traffic, nor are you interested in filtering the IDS traffic for port numbers. Here is how to use a BRANCH to implement such rule logic:

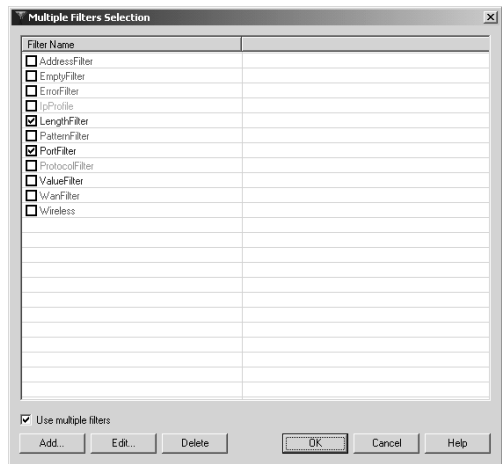


When you chain multiple rules in a filter, packets are processed using the “first match wins” method: If a packet matches any include or exclude rule in the filter, it is not processed any further, and the rules that follow the match are never applied to the packet.

Applying Multiple Filters

In addition to applying multiple rules within filters, you can apply multiple filters to both realtime and post-filtered captures. You can apply each filter alone or in any combination.

To apply multiple filters, check the “Use Multiple Filters” checkbox at the lower left. Checking this box displays the **Multiple Filters Selection** list. In this example, 2 of the 11 user-created filters will be applied:



From the **Multiple Filters Selection** dialog, you can:

- Select which filters to apply by clicking the checkboxes.
- Edit and Delete filters by selecting them and using the button controls
- Add a new filter, which displays the filter rule editor for the new filter.

Double clicking on a filter brings you directly to the rule editor. Besides giving descriptive names to filters, you can also set the display color of each filter in the list by right-clicking and choosing **Set Color...**

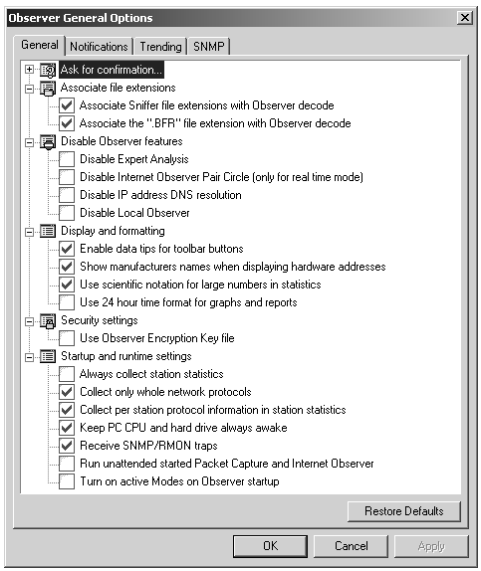
The Options Menu

Observer General Options

The **Observer General Options** dialog allows you to select the general settings for Observer. These include general configuration options, email options, pager options, and SNMP options (if you have purchased Observer Suite). Default options are described in this manual; your views may vary based on the settings you apply.

Select **Options > Observer General Options.** The **General Tab** dialog will be displayed. It contains a browsable tree of configuration folders and options, which are described below.

Observer General Options – General Tab


Observer General Options
General
Notifications
Trending
SNMP
Ask for confirmation...
Associate file extensions
Associate Sniffer file extensions with Observer decode
Associate the ".BFR" file extension with Observer decode
Disable Observer features
Disable Expert Analysis
Disable Internet Observer Pair Circle (only for real time mode)
Disable IP address DNS resolution
Disable Local Observer
Display and formatting
Enable data tips for toolbar buttons
Show manufacturers names when displaying hardware addresses
Use scientific notation for large numbers in statistics
Use 24 hour time format for graphs and reports
Security settings
Use Observer Encryption Key file
Startup and runtime settings
Always collect station statistics
Collect only whole network protocols
Collect per station protocol information in station statistics
Keep PC CPU and hard drive always awake
Receive SNMP/RMON traps
Run unattended started Packet Capture and Internet Observer
Turn on active Modes on Observer startup
Restore Defaults
OK
Cancel
Apply

- The **Ask for confirmation...** options let you set whether Observer will prompt you to Click on OK before closing dialogs and completing other operations.
- The **Associate file extensions** options let you set up Windows to automatically load Observer whenever the selected file type is double-clicked from Explorer.

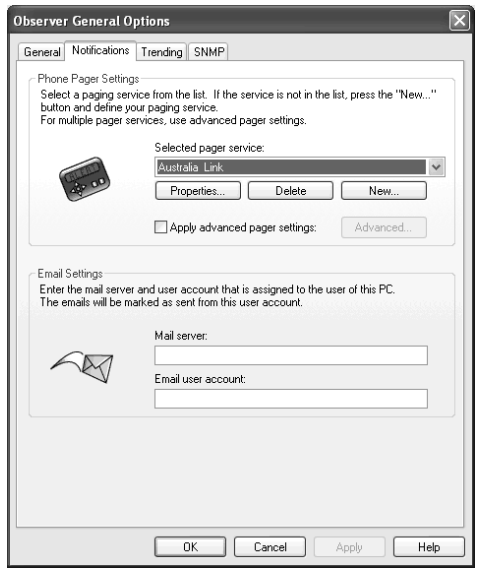
- The **Disable Observer features** options let you choose to disable selected Observer features for bandwidth, processor, or security reasons. You can choose to:
  - disable the Expert Analysis portion of the Packet Capture mode.
  - disable the local internal Probe, i.e., make the system a remote console only.
  - disable DNS name resolution, in all modes that would otherwise show DNS names.
- **Display and formatting** options let you:
  -enable or disable data tips (in other words, tooltip help) for toolbar buttons
  -show or hide manufacturer's names when displaying hardware (MAC) addresses
  -use the 24 hour format for graphs and reports. In 24 hour format 2pm is 14:00
  -use or scientific notation for large numbers.

  Scientific notation, also known as exponential notation, is the process of taking large numbers and making them easier to read at a glance. It simplifies numbers by getting rid of the zeros. In Observer's case we take any number that is above 999,999 and place it into scientific notation.

  For example: 11,800,000 would be represented as 11.8e6. The e denotes the exponential, or the number of 0's to be used after the decimal place. 11.8e6 would be 11800000 bytes, or roughly 11.8 MB. The number after the e shows the number of 0's after the decimal place.
- **Security**: Strong encryption is available for Advanced MultiProbe and Observer Suite users. Encryption key files let you use private encryption keys to ensure that unauthorized persons do not have access to the data flowing between Observer consoles and Probes.

  To use encryption keys, you must copy the encryption key file into the installation directory (usually "C:\Observer Files") of each Probe or Console that you want to authorize. To generate a key file, use the Encryption Key Utility (which is located in the Observer program group from the Windows Start Menu). Its online help explains its use and how to set up the keys it generates.
- The Startup and runtime options let you configure how Observer behaves when it first starts up, and what kinds of statistics it should keep track of:
  - **Keep PC CPU and hard drive always awake**, if selected, prevents the hard drive from going into a power save spindown.
  - **Receive SNMP/RMON traps**, if selected, enables Observer to receive SNMP or RMON traps.
  - **Turn on active Modes on Observer startup**, if selected, causes Observer to automatically load previously active (open) modes.
  - **Run unattended started Packet Capture and Internet Observer**, if selected, runs Packet Capture and Internet Observer without user intervention when Observer opens. This is allowed only if the "Turn on active Modes on Observer startup" checkbox is selected.

Observer General Options–Notifications Tab



The Notifications tab lets you set up the page and email services that Observer uses to contact the administrator when the criteria set in Triggers and Alarms have been met (see “Triggers and Alarms Mode” on page 148).

Paging Server Settings

Observer’s paging interface is a complete messaging system for sending alarms to pagers and cell phones using a modem or Internet connection to a pager service carrier. It includes a Windows tray icon that provides instant access to Observer’s built-in paging server.

Configuring a pager service requires you to have some information about the pager service. When a modem is used, you will need to know about the modem installed or connected to the Observer PC.

Paging Server Information Checklist

To set up a pager service, you need to obtain the following configuration information from the pager service supplier:

> Network Instruments’ technical support does not have pager service information.

For SNPP-Based Paging Services

- PIN (destination)—provided by your pager service provider.
- Login ID, if any—provided by your pager service provider.
- Password (if any)—provided by your pager service provider.

- Server IP address—IP address of the pager service provider.
- Port number—port number of the pager service provider.

For Protocol-Based Paging Services (TAP or UCP)

- PIN (destination)—provided by your pager service provider.
- Login ID, if any—provided by your pager service provider.
- Password, if any—provided by your pager service provider.
- Message type—alphanumeric (sends numbers and letters to a pager), numeric (generates only numbers), and tone (messages transmitted via tone).
- Maximum message length—the maximum number of lines your paging service provider supports.
- Modem line—allows you to select the modem to use.
- Modem connection speed—allows you to select the speed your modem will connect to the pager service provider.
- Data bits—the number of bits used in communication by the service provider.
- Parity—many communication programs add an extra bit of data (a parity bit) to each group of bits sent together as a check to whether they all arrived. Parity checking can be selected to be “Even” (a successful transmission will form an even number) or “Odd.” If the service provider does not use parity checking, the selection should be sent to “None.”
- Stop bits—communication programs send 1 or 2 bits to tell the program at the other end that it is beginning or ending a data transmission.

  Most service carriers use either 7E1 (7 data bits, even parity, 1 stop bit) or 8N1 (8 data bits, no parity, 1 stop bit).

- Protocol—the communication protocol used by the paging service provider.

For a Voice-Based Paging Service

- Paging service phone number—the pager number.
- Delay before sending messages—the number of seconds to pause before sending messages.
- Preliminary dial sequence—the numbers to be dialed after the paging service number prior to sending a message.
- Closing dial sequence.

Configuring Your Paging Service

You may have to modify some settings in order to adapt to the local environment. It will be necessary to choose among the provided services or install a new paging service and substitute the local pager access number, if any, for the supplied one.

Phone Pager Settings
Select a paging service from the list. If the service is not in the list, press the "New..." button and define your paging service.
For multiple pager services, use advanced pager settings.
Selected pager service:
Australia Link
Properties...
Delete
New...
Apply advanced pager settings:
Advanced...

1. Select the Default pager configuration from the dropdown menu.

   If your pager is not on the list, click on the NEW button. The Paging Service Properties dialog will be displayed. see “Paging Server Information Checklist” on page 235.

2. To view the initial pager configuration dialog, click the PROPERTIES button. The **Paging Service Properties** dialog will be displayed.

3. Enter the Service name. This is the name of the service used to access the pager; the Service name you selected from the dropdown list is your default.

4. Enter the Service phone number—use the international number format (e.g., “+1 (123) 1234567”) in order to allow TAPI to work with the Windows location settings.

   This textbox will not be displayed if you are using a SNPP pager service, as SNPP uses TCP/IP to communicate with the paging service, rather than a modem.

   If it’s necessary to have Observer wait for an outside line, insert one or more commas at the beginning of the string (e.g., “,,,+1 (123) 123-4567”).

   Additional spaces and the hyphen in the phone number are optional; they make the number more easily readable by the user, but will be ignored when

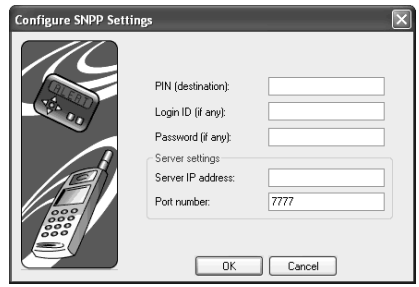
dialing: Observer will dial only the numbers and pause for approximately one-half second for each comma character.

5. Select a Service protocol from the dropdown list. Observer supports four different pager service protocols: TAP, UCP, SNPP, and Voice. Selecting the appropriate service protocol and clicking the CONFIGURE button enables the user to enter service-specific configuration data. Each protocol displays a different set of options that need to be set. Those options are described below for each protocol.
6. Enter the maximum message length for the pager.
7. Click the OK button.

Configure SNPP Settings

SNPP (Simple Network Paging Protocol) is a new standard whereby pager messages can be sent by a computer over the Internet, rather than requiring the sender to configure and use an installed modem.

One advantage to using an SNPP service is that most of the configuration is done on the server side by the paging service provider.



Configuring SNPP pagers requires the following information:

- "PIN (destination)" textbox—enter the PIN of the destination for the page.

  Usually, this will be the recipient's pager number, but some service providers will require you to prefix or postfix additional numbers to it.

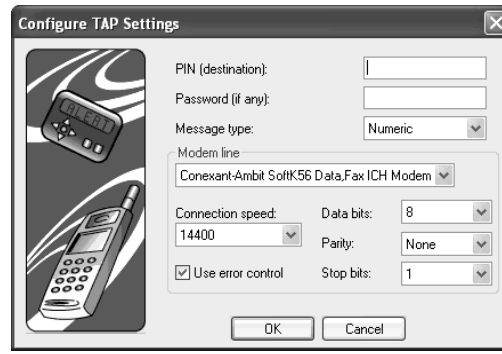
- "Login ID (if any)" textbox—enter the login ID. If you have a login ID, it will have been provided by your paging service provider.
- "Password (if any)" textbox—enter the password for the paging service. If you have a password, it will have been provided by your paging service provider.

Server settings:

- "Server IP address" textbox—enter the IP address (e.g., "192.168.0.123") or DNS name (e.g., "pager.impossico.com"). This will have been provided by your paging service provider.
- "Port number" textbox—enter the port number. By default, it is 7777, but may vary. This port number will have been provided by your paging service provider.

Configure TAP Settings

TAP (Telecator Alphanumeric Protocol) is a messaging industry standard protocol for sending message requests from automated equipment. TAP is the most common protocol used in the United States.



- "PIN (destination)" textbox—enter the PIN of the page destination.

  Usually, this will be the recipient's pager number, but some service providers will require you to prefix or postfix additional numbers to it.

- "Password (if any)" textbox—enter the password for the paging service. This will have been provided by your paging service provider.

- "Message type" dropdown—allows you to select the type of pager: Alphanumeric, Numeric, or Tone.

  All paging services support one or more of these types of messages; some support more than one. If in doubt, the first type to try would be Numeric, as Alphanumeric messages are a superset of Numeric.

- "Modem line" dropdown—allows you to select from among the currently defined modem devices. These devices are from those defined for the system in the Start > Setttings > Control Panel > Phone and Modem Options dialog.

  If the dropdown is blank, Windows does not identify a modem installed and/or properly configured on your machine. You cannot dial a paging service without a modem. After physical installation, it is necessary to configure the modem by clicking **Start > Setttings > Control Panel > Phone and Modem Options**.

  After adding or configuring a modem, you may need to restart Observer and/or Windows before the modem will become visible to the system.

The following settings depend on the configuration required by the paging service provider and should be provided by them. If in doubt, try the default settings first.

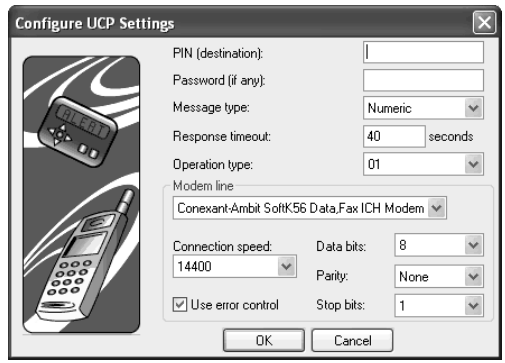
- "Connection speed" dropdown—allows you to select the connection speed of the modem to your service provider.

- “Use error control” checkbox—allows you to select whether or not the modem’s error control features will be enabled.
- “Data bits” dropdown—allows you to select the number of data bits to be used in communicating with the modem.
- “Parity” dropdown—allows you to select the parity to be used in communicating with the modem.
- “Stop bits” dropdown—allows you to select the data bits to be used in communicating with the modem.

Configure UCP Settings

UCP (Universal Computer Protocol) is a messaging industry standard protocol for sending message requests from automated equipment.

UCP is the most common pager protocol used in Europe.



- “PIN (destination)” textbox—enter the PIN of the destination for the page.

  Usually, this will be the recipient’s pager number, but some service providers will require you to prefix or postfix additional numbers to it.

- “Password (if any)” textbox—enter the password for the paging service. This will have been provided by your paging service provider.
- “Message type” dropdown—allows you to choose between Alphanumeric, Numeric, and Tone messages.
- “Response timeout” textbox—allows you to select the number of seconds before the response times out.
- “Operation type” dropdown—allows you to choose the appropriate UDP operation type: 01, 03, 50, or 51. This information will have been provided by your paging service provider.

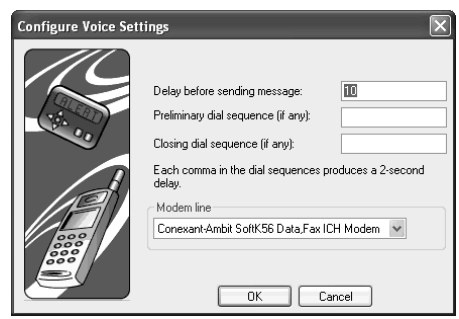
  If in doubt, select 01, which allows for simple messaging. The other operation types offer a superset of that functionality.

- “Modem line” dropdown—allows you to select from among the currently defined modem devices. These devices are from those defined for the system in the Windows Control Panel.

  The following settings depend on the configuration required by the paging service provider and should be provided by them. If in doubt, try the default settings first.

- “Connection speed” dropdown—allows you to select the connection speed of the modem to the service provider.
- “Use error control” checkbox—allows you to select whether or not the modem’s error control features will be enabled.
- “Data bits” dropdown—allows you to select the number of data bits to be used in communicating with the modem.
- “Parity” dropdown—allows you to select the parity to be used in communicating with the modem.
- “Stop bits” dropdown—allows you to select the data bits to be used in communicating with the modem.

Configure Voice Settings

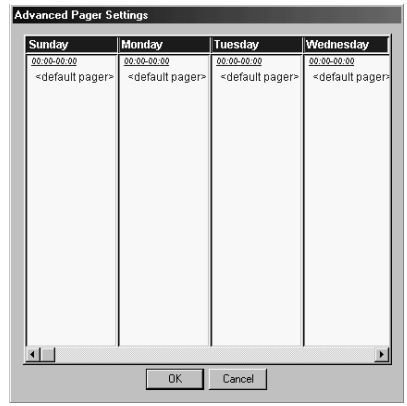


Voice-based paging services require the following information:

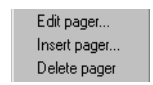
- “Delay before sending message” textbox—allows you to enter the number of seconds that the program should pause after connection before sending the message.
- “Preliminary dial sequence (if any)” textbox—allows you to enter a sequence of numbers that the program should send after connection, but before sending the message.
- “Closing dial sequence (if any)” textbox—allows you to enter a sequence of numbers that the program should send after sending the message, but before hanging up the connection.
- “Modem line” dropdown—allows you to select from among the currently defined modem devices. These devices are from those defined for the system in the Windows Control Panel.

Advanced Pager Settings

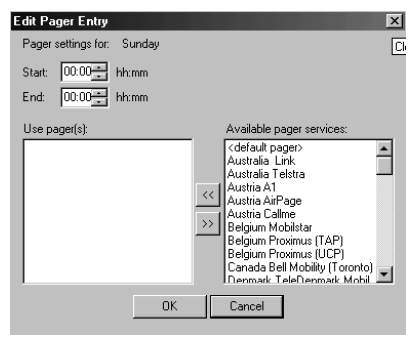
1. Check the "Apply advanced pager settings" checkbox and click on the ADVANCED button to display the **Advanced Pager Settings** dialog.



2. Right-click on a pager item to display the Advanced Pager Settings options.



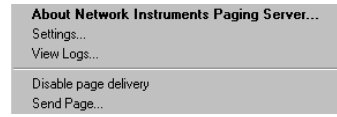
3. Click on "Edit pager" or "Insert pager" to display the **Edit Pager Entry** dialog.



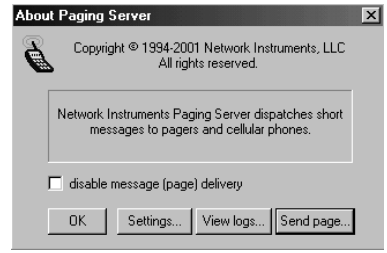
4. Select your start time from the "Start" spinbox.
5. Select your end time from the "End" spinbox.
6. Select the pagers you wish to use from the list of available paging services.
7. Click on the OK button.

Pager Service Tray Icon

When Observer is launched, the icon is displayed in the Windows tray. You can right-click on the icon to display a menu or you can double-click on the icon to display the **About Paging Server** dialog.

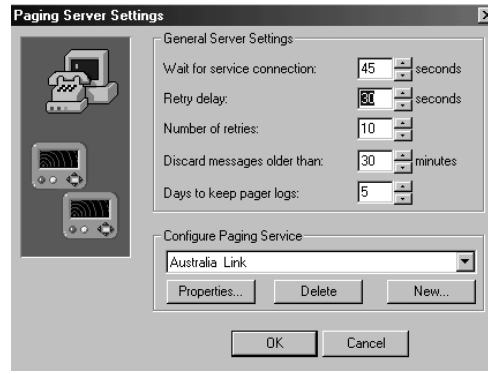


The items on the menu are not listed in the same order as in the dialog, but contain the same information.



- "Disable message (page) delivery" checkbox—checking this box disables the sending of pager messages; clearing this box enables messages to be sent.
- Ok button—closes the dialog.
- Settings button—opens the Paging Server Settings dialog. see "Paging Server Log" on page 245.
- View logs button—opens the Paging Server Log viewer. see "Paging Server Log" on page 245.
- Send page button—opens the Send Page dialog. see "Send Page" on page 245.

Paging Server Settings



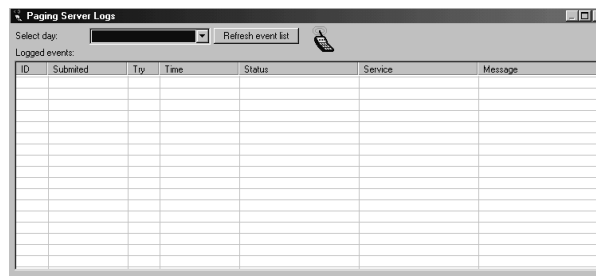
The **Paging Server Setting** dialog contains the following items:

- "Wait for service connection" (seconds) spinbox—allows you to set the time for a service connection.
- "Retry delay" (seconds) spinbox—allows you to set the interval between attempts to send a pager message.
- "Number of retries" spinbox—allows you to set the number of times to retry sending a failed pager message.

  When the pager message is successfully sent, further retries are aborted.

- "Discard messages older than" (minutes) spinbox—allows you to set the number of minutes to attempt to keep sending a paging message. After this time period, if minutes are reached, the message, even if not sent, is discarded.
- "Days to keep pager logs" spinbox—allows you to set the number of days to keep pager logs. Log entries older than this are purged.
- "Configure Paging Service" dropdown—allows you to configure your paging service. See "Configuring Your Paging Service" on page 237.

Paging Server Log

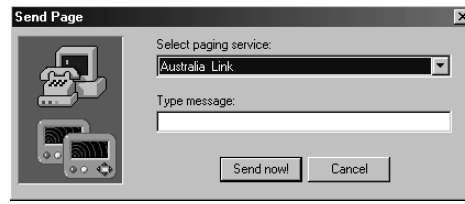


- "Select day" dropdown—allows you to select the service log day.

- Refresh event list button—clears the event list.

Send Page

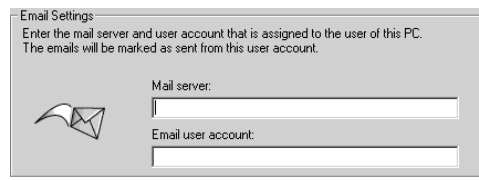
The primary use of Send Page is to enable the user to test the paging service without creating an error event to trigger a page. It also can be used simply as a convenient way to send a pager message from the Windows desktop.



- "Select paging service" dropdown—allows you to select your paging service.
- "Type message" textbox—allows you to type a test message.

Setting up Email Notifications

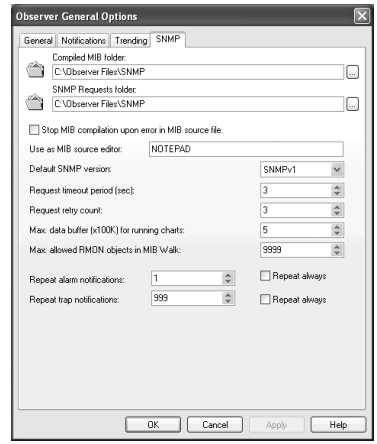
Allows you to enter the mail server and user account name assigned to the Observer PC user. Destination stations will receive notifications addressed "From" this user account.


Email Settings
Enter the mail server and user account that is assigned to the user of this PC.
The emails will be marked as sent from this user account.
Mail server:
Email user account:

- "Mail server" textbox—allows you to enter your SMTP mail server's address (e.g., "myserver.com").
- "Email user account" textbox—allows you to enter the user account name; this name will be displayed as the "From" address.

Observer General Options – SNMP Tab

This tab will not be active unless you have purchased a licensed copy of Observer Suite. After installation, the SNMP Management Console will generally require little, if any, configuration before it can be used.



- "Compiled MIB folder" textbox—allows you to define the path to the directory where SNMP Management Console should look for compiled MIB files.

  The default is "C:\Observer Files\SNMP." We do not recommend changing this unless you have a specific reason to do so. When you change the MIBs or requests directory, any currently installed MIBs (or requests) will become inaccessible to the SNMP Management Console and its supporting utilities. If you change these directories, you will need to move the files in the existing directories to the new location. All executable files in the SNMP Management Console package use these definitions to find installed MIBs and requests.

- "SNMP Requests folder" textbox—allows you to define the path to the directory where SNMP Management Console should look for compiled request files.

  The default is "C:\Observer Files\SNMP." It is recommended that you do not change this unless you have a specific reason to do so.

- "Stop MIB compilation upon error in MIB source file" checkbox—allows you to stop MIB compilation when an error is encountered in the MIB source file.

- "Use as MIB source editor" textbox—allows you to enter the program you wish to use to edit MIB source files.

  The default is Microsoft Windows Notepad, although any editor capable of saving a plain text file will do.

- "Default SNMP version" dropdown—allows you to select the default version of SNMP to use for new agents. You may also override this in the Agent Properties dialog.

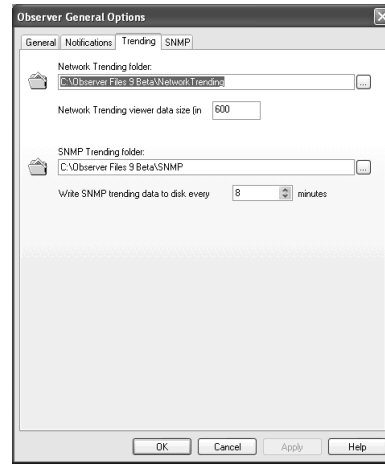
SNMPv1 is, in practice, by far the most commonly-used standard; very few agents support SNMPv2.

- "Repeat alarm notifications" spinbox—allows you to select the number of times that Observer should send out SNMP-related alarms when the alarm has been triggered.
- "Repeat trap notifications" spinbox—allows you to select how many times to repeat trap notifications.

  While, in practice, the vast majority of notifications sent via UDP will reach their destination, the UDP protocol, which is specified by the SNMP RFC for trap notification, does not require or permit packets being acknowledged by the receiving station. It is simply a matter of sound practice to repeat trap notifications several times.
- "Request timeout period (sec)" spinbox—allows you to set the number of seconds that SNMP Management Console will wait for an agent to respond before resending a request.
- "Request retry count" spinbox—allows you to define how many times SNMP Management Console will re-send a request to an agent before timing out.
- "Max data buffer (x100K) for running charts" spinbox—allows you to define how much memory will be made available for SNMP Management Console's chart display.

  The more memory made available, the more data points the chart display will be able to show. Memory saved for the SNMP Management Console's chart display; however, will not be available for other programs or purposes.
- "Check this box to enable all optional hint messages" checkbox—if selected, allows you to enable any optional hint messages for SNMP Management Console that you have previously disabled.

Observer General Options – Trending Tab



- "Network Trending Folder" sets the location for Observer to store Network Trending data.
- "SNMP Trending Folder" sets the location for Observer Suite to store SNMP Trending data.
- "Write SNMP Trending data to disk every *x* minutes" spinbox—allows you to set the number of minutes the system will wait before sending logs.

Observer Memory and Security Administration

Configuring Multi-Probe Connections

If you have a Multi-Probe license, you can:

- configure Observer's local Probe to view multiple networks if multiple NICs are installed on the local PC
- configure Observer's local Probe to provide multiple Observer consoles with views of the local network interfaces

To configure these options, choose Options->Observer Memory and Security Administration from the Observer main menu. The following dialog is displayed:

About Probe Instances

To provide for multiple network interfaces and multiple consoles, the local Probe creates multiple *instances* of itself. A Probe instance is a "virtual" Probe with attributes that define:

- which network interface on the local PC to capture data from

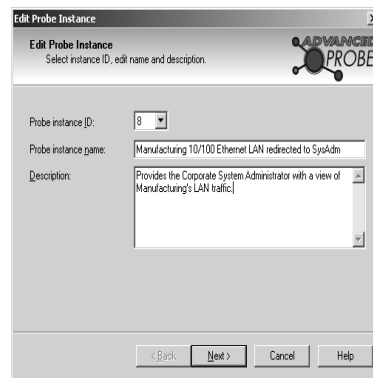
- which Observer console (local or remote) to direct the data to.

Creating a Probe Instance

To set up a Probe Instance, follow these steps:

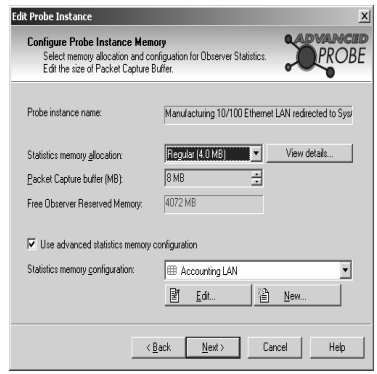
1. Click the **Adapters and Redirection** tab to display the current list of instances:

2. Click **New Instance...** to begin the Instance wizard, which steps you through naming and setup of the new instance:



3. Select an instance ID, then name and describe the instance you are creating. Click **Next...** when you are finished.

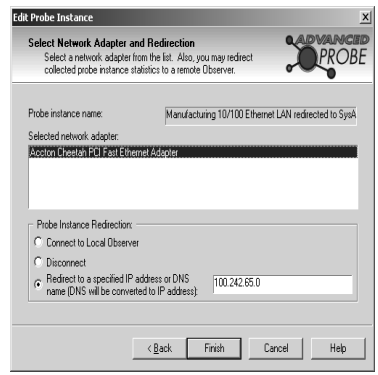
The Memory Configuration dialog is displayed:



4. Select an appropriate Capture Buffer size given the local system's available memory and how much traffic you plan on capturing from the given network.

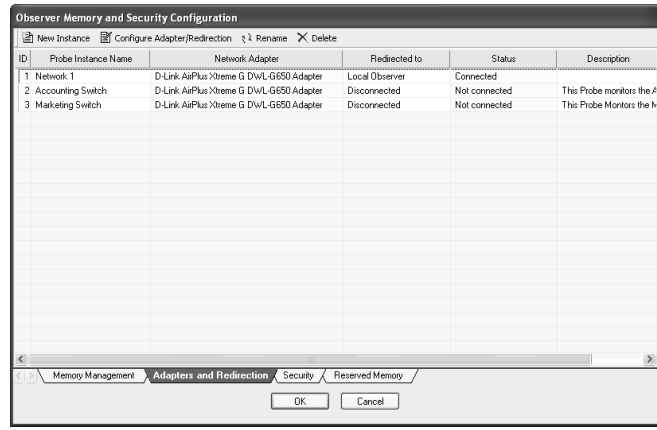
   Statistical reporting uses different memory and much less of it. Although it is possible to customize the amounts of memory used by Observer's various statistical displays (by checking the **Used Advanced Statistics Memory Configuration** option), for most situations the defaults will work perfectly well.

   Click **Next** to continue, and the adapter/redirection configuration dialog is displayed


Edit Probe Instance
Select Network Adapter and Redirection
Select a network adapter from the list. Also, you may redirect collected probe instance statistics to a remote Observer.
ADVANCED PROBE
Probe instance name:
Manufacturing 10/100 Ethernet LAN redirected to SysA
Selected network adapter:
Accton Cheetah PCI Fast Ethernet Adapter
Probe Instance Redirection:
Connect to Local Observer
Disconnect
Redirect to a specified IP address or DNS name (DNS will be converted to IP address)
100.242.65.0
< Back
Finish
Cancel
Help

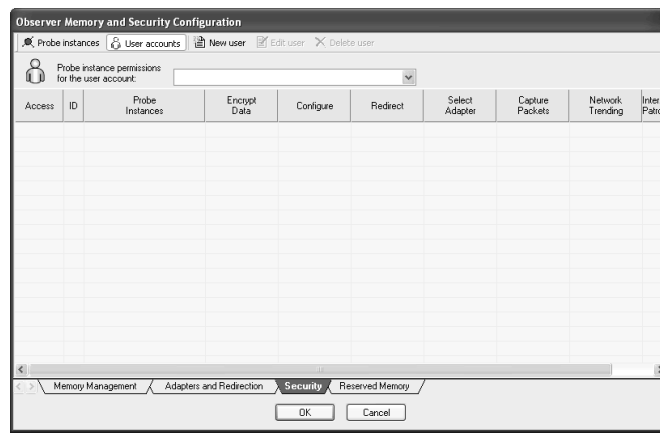
5. Choose an adapter to associate with this instance, and a destination for the Probe to direct its analysis data. "Local Observer" means the Observer console through which the Probe is being configured; when configuring a stand-alone Probe this option will be grayed out. Click **Finish** when you are done.

The **Probe Adapters and Redirection** tab will now list the new Probe instance:



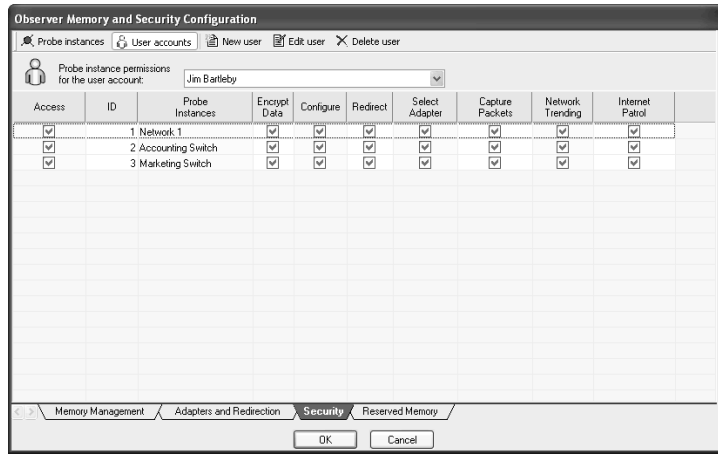
Configuring User Accounts for Secure Access

If you wish to restrict access to packet captures and reporting provided by a Probe instance, you can define security attributes of the local Probe by clicking the **Security** tab:



The example above shows the Security tab as it appears when the Probe Instances button in the upper left corner of the display is selected. This view lets you select a Probe instance from the dropdown list box and display users that have access to that instance and their permissions.

To display security information by user account, press the User Account button to the left of the Probe Instances button. This lets you see what permissions the currently selected user has access to on each instance of the Probe:.



When displaying a user account's permissions as above, you can use the checkboxes to fine-tune the permissions that user has on each account by clicking on the Permissions checkboxes to select or deselect the particular option. The different types of permission are described below:

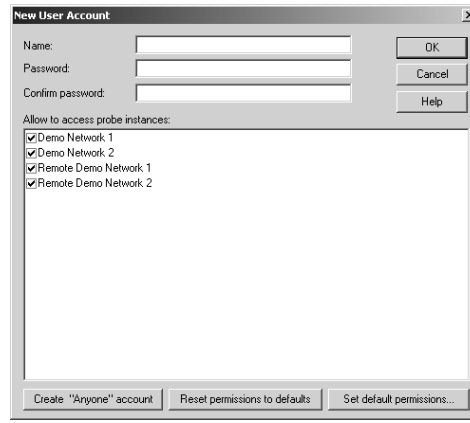
Permission	Explanation
Encrypt data	Data sent to the console will be triple-DES encrypted during transmission. Triple-DES is an extension of the original 56-bit key Data Encryption Standard approved by the National Security Agency. By making 3 DES encryption passes, it increases the effective key length to 168 bits. Only use this option if you need strong encryption, because it imposes a significant performance cost. Even with this option turned off, the Probe will not send raw, easily-readable data; it will be concealed by the proprietary compression algorithm.
Configure	User is allowed to change the Probe's configuration options (such as memory usage, etc.).
Redirect	User is allowed to change the destination console for Probe analysis data.
Select Adapter	User is allowed to change the adapter setting for the Probe.
Capture Packets	User is allowed to view captured packets from the Probe's network.
Network Trending	User is allowed to view Network Trending data from the Probe's network.

Permission	Explanation
Internet Patrol	User is allowed to run Internet Patrol on the Probe's network.

Creating or Editing a User Account

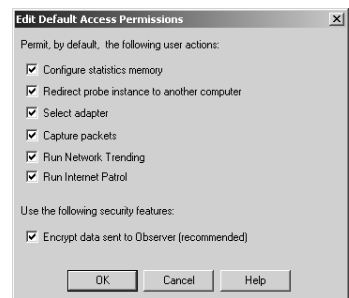
To create a new account click **New User Account**; to edit an existing account, select the account and click **Edit User Account**. These options are also available on the right-click menu.

The setup options are the same whether you are creating a new account or editing an existing account:



Fill out the name and password fields and select the instances you want this account to have access to.

By default, when you give an account access to an instance, that account will have permission to do everything it is possible to do with a Probe instance: receive all statistics and capture packets, redirect it, configure its memory, etc. If you want to change the default permissions for the user you are creating or editing, click **Change Default Permissions...**, which displays the **Set Default Permission**s dialog:



Check the desired options and click **OK**. When you grant this account access to another Probe instance, the permissions will be automatically set to match what you have selected here. You also will be able to reset this user's permission to these values on any Probe instance by right-clicking the account or instance and choosing the **Reset User Account Permissions** option from the popup menu**.**

Customizing Statistics and Capture Buffers For Probe Instances

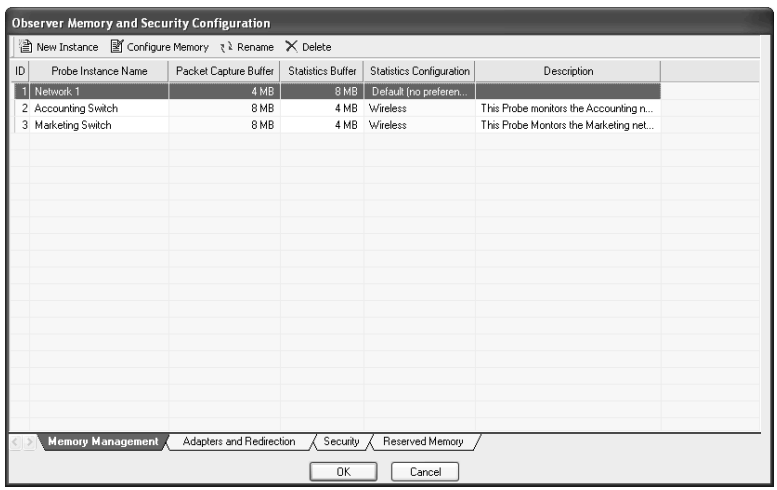
There are two kinds of buffers that a Probe uses to store data in real-time: Capture buffers and statistical buffers. The capture buffer is used to store the raw data captured from the network; the statistical buffers store data entries which are series of snapshots of a given statistical datapoint.

Selecting an appropriate capture buffer size given system resources is all most users need to worry about; the default settings for the statistical buffers work perfectly fine in the vast majority of circumstances.

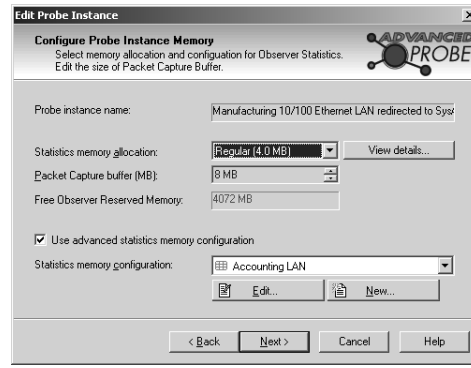
However, if you are pushing the limits of the PC system on which the Probe is installed by creating many instances, you may be able to avoid some performance problems by fine-tuning the memory allocation for each instance.

For example, suppose you want to give a number of remote administrators access to Top Talkers data from a given Probe. You will be able to add more instances within a given system's memory constraints if you set up the statistics buffers to only allocate memory for tracking Top Talkers and to not allocate memory for statistics that no one will be looking at.

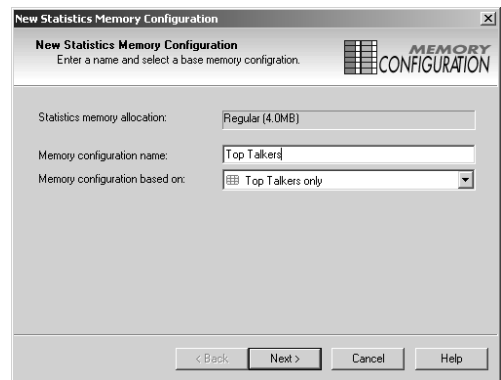
To view and manage memory allocation for Probe instances, click the Memory Management tab to display the list of instances and their buffer sizes:



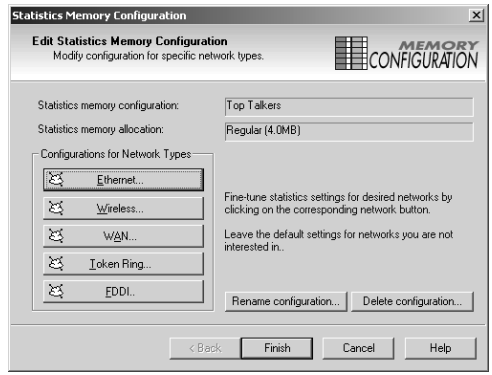
Right click any instance and select **Edit Probe Instance...** to access the memory allocation dialog:



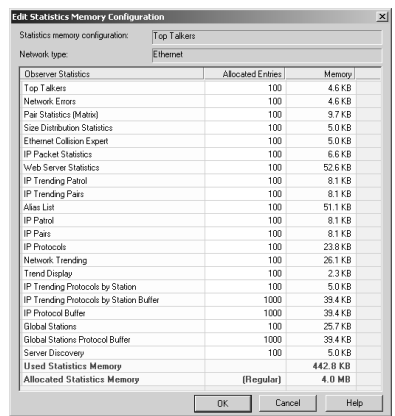
This dialog lets you select the Capture buffer size, as well as letting you pick from a number of Statistics memory “presets” (Regular, Large, and Extra Large). If you want finer control over the statistics memory allocation, check the **Use Advance Statistics Memory Configuration** option, which lets you select from a number of statistics memory presets that you can define and edit yourself. Clicking **New**... or **Edit...** displays the setup dialog:



Enter a descriptive name for the custom memory configuration and select a previous configuration as a model for the new configuration if desired. Click **Next>** to display the second setup dialog:



By clicking on one of the Network Types buttons, you can view and change the number of entries allocated for each statistical type:


Edit Statistics Memory Configuration
Statistics memory configuration: Top Talkers
Network type: Ethernet
Observer Statistics | Allocated Entries | Memory
Top Talkers 100 4.6 KB
Network Errors 100 4.6 KB
Pair Statistics (Matrix) 100 9.7 KB
Size Distribution Statistics 100 5.0 KB
Ethernet Collision Expert 100 5.0 KB
IP Packet Statistics 100 6.6 KB
Web Server Statistics 100 52.6 KB
IP Trending Patrol 100 8.1 KB
IP Trending Pairs 100 8.1 KB
Alias List 100 51.1 KB
IP Patrol 100 8.1 KB
IP Pairs 100 8.1 KB
IP Protocols 100 23.8 KB
Network Trending 100 26.1 KB
Trend Display 100 2.3 KB
IP Trending Protocols by Station 100 5.0 KB
IP Trending Protocols by Station Buffer 1000 39.4 KB
IP Protocol Buffer 1000 39.4 KB
Global Stations 100 25.7 KB
Global Stations Protocol Buffer 1000 39.4 KB
Server Discovery 100 5.0 KB
Used Statistics Memory 442.8 KB
Allocated Statistics Memory (Regular) 4.0 MB
OK
Cancel
Help

An *entry* is a record of the given statistic; for example, a Top Talker entry consists of a station, for errors, an entry would consist of error listing. When you constrain a report to *n* number of entries, the Probe will only report the last *n* entries to the Observer console; entries after the *n*th entry are never reported or displayed on the Observer console. Observer informs you when the Probe is exceeding its memory buffer for a particular statistic by displaying an error message.

Setting the Total System Memory reserved for Probes

Because Observer operates in real-time, its buffers must always remain in RAM; if the buffers resided in standard Windows user memory, nothing would prevent the buffer file from being swapped out to disk and subsequent packet loss. For this reason, the Probe

reserves its memory from Windows upon startup so that no other applications can use it and cause the buffer to be swapped out to disk.

Although the default amount of total reserved memory should work perfectly in most situations, you can change it. Click the Observer Reserved Memory tab to display how much memory is reserved for Probe operation and how much memory is left for Windows:

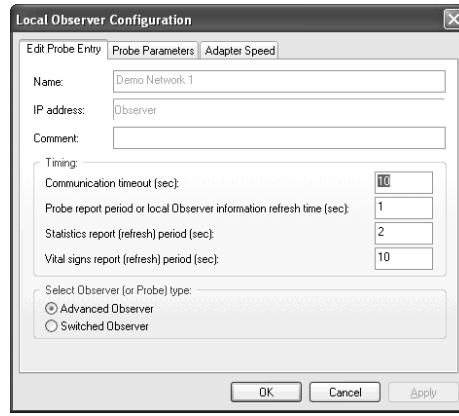
Observer Memory and Security Configuration
Observer Reserved Memory:
0 MB
Modify...
Memory left for Windows OS:
0 MB
Total physical system memory:
0 MB
If you modify Observer Reserved Memory, the computer will have to be restarted for the change to take effect. Observer/Probe will shut down and will not restart until after the restart of the computer.
The minimum required memory left for Windows OS is 256 MB, the recommended value is at least 400 MB.
Memory Management
Adapters and Redirection
Security
Reserved Memory
OK
Cancel

The setup screen will not allow you to reserve memory in excess of what Windows needs to run, but it will allow you leave less than the optimum amount necessary for Windows to perform at its best. Proceed with caution; any performance benefits you might gain by increasing Observer's allotment can be lost if you do not leave enough memory for Windows to perform well.

Selected Probe or SNMP Device Properties

The Probe Options menu item lists and allows you to configure options for the currently active probe. This includes the built-in probe that is part of the basic Observer product. To open the Probe Options, select Options > Selected Probe or SNMP Device Properties.

Edit Probe Entry Tab



- "Name" textbox—displays the name of the Probe.

  Note: The Local Probe title address and comment cannot be edited.

- "IP address" textbox—displays the IP address of the Probe system.
- "Comment" textbox—displays the view comments of the Probes area.

Timing:

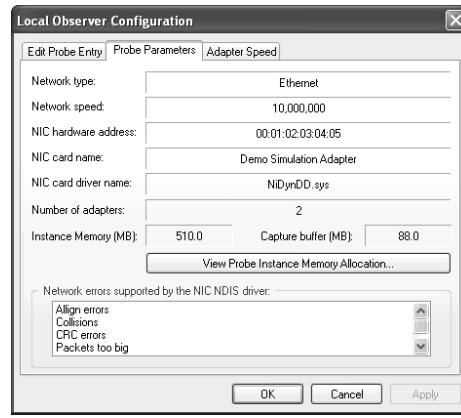
- "Communication timeout (sec)" textbox—allows you to define how long Observer will wait for the Probe to communicate before it assumes the connection is lost. Values are from 2 to 60 seconds.
- "Probe report period or local Observer information refresh time (sec)" textbox—allows you to set how often the Probe sends a refresh packet or how often the local Observer's dialogs are refreshed. This value has a minimum of 2 seconds with no maximum.
- "Statistics report (refresh) period (sec)" textbox—allows you to set the statistics display refresh period. This value has a minimum of three seconds with no maximum.
- "Vital signs report (refresh) period (sec)" textbox—allows you to set the Network Vital Signs refresh period. Values are from 10 to 600 seconds.

Select Observer (or Probe) type:

- Advanced Observer option button—defines Observer (or the Probe) as a standard (non-switched) Observer or Probe. Changing this option will close all modes.
- Switched Observer option button—defines Observer (or the Probe) as switched. Changing this option will close all modes.

Note: When switching from Advanced to Switched mode, you must configure Observer for switched operation. Details on how this is done are found in the “Switch Configuration” section of this manual.

Probe Parameters Tab



- “Network type”—displays the Probe’s network topology. Possible topologies include Ethernet, Token Ring, FDDI, and Dialup.
- “Network speed”—displays the network speed.

  The distinction here is between the actual, measured speed of the network and the speed that the NIC card, possibly incorrectly, reads from its connection. For example, a 10/100MB NIC card on a 10/100MB connection to a switch on a network where all the other stations are running at 10MB will report the network speed as 100MB.

  This item is the actual number that the NIC card driver sends Observer, so 10MB Ethernet will be reported as “10,000,000”. 100MB Ethernet will be reported as “100,000,000”.

- “NIC hardware address”—displays the hard address of the Probe’s NIC.
- “NIC card name”—displays the name of the card as reported by the NDIS driver to the registry.
- “NIC card driver name”—displays the name of the card driver as reported by the NDIS driver to the registry.
- “Probe (Local Observer) VxD”—displays the name of the driver file used by the local Observer or Probe.
- “Number of adapters”—displays the number of cards the local Observer o r Probe has configured.
- “RAM available (MB)”—displays the amount of RAM the local Observer or Probe reports have available.

- “Maximum capture buffer (MB)”—displays the maximum capture buffer Observer will allow you to configure. Observer has no limitations on the amount of RAM that can be used for a buffer. The maximum allowable buffer size is displayed in the Options > Selected Probe or SNMP Device Properties > Probe Parameters tab. The following formulas are used to calculate the maximum allowable buffer:

For Observer:

Maximum Buffer Size = (Total Physical Memory—18MB) *.4. The total amount allocated cannot exceed 100 MB.

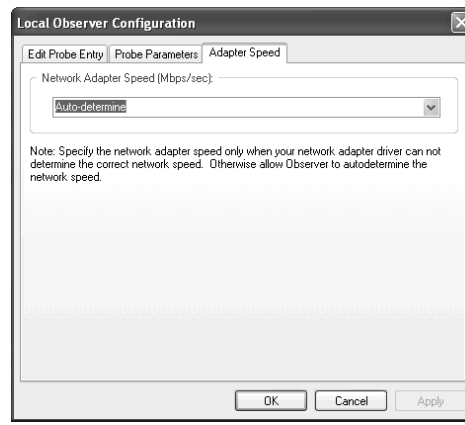
For Expert Observer and Observer Suite:

You can allocate up to 4 gigabytes, limited only by the physical memory installed on your system.

> In all cases, the actual buffer size (Max Buffer Size) is also reduced by 7% for memory management purposes. Should you try and exceed the Max Buffer Size an error dialog will be displayed indicating the minimum and maximum buffer size for your Observer (or Probe) buffer.

- “Network errors the NIC NDIS driver claims to provide”—displays the aggregate errors that your NDIS driver claims to provide statistics for.

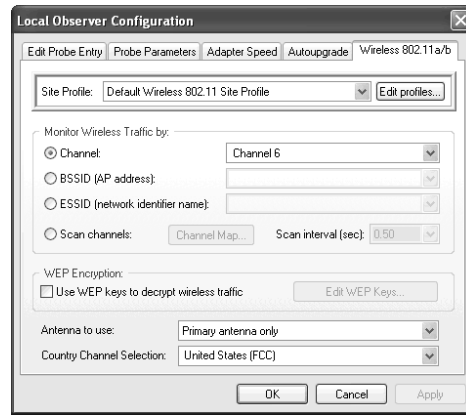
Adapter Speed Tab


Local Observer Configuration
Edit Probe Entry
Probe Parameters
Adapter Speed
Network Adapter Speed (Mbps/sec):
Auto-determine
Note: Specify the network adapter speed only when your network adapter driver can not determine the correct network speed. Otherwise allow Observer to autodetermine the network speed.
OK
Cancel
Apply

The Adapter Speed tab contains a dropdown box from which you can choose to let Observer and the NIC card automatically determine the network speed, or to select from various values (in megabits per second) for the network speed to be used for calculations.

> The primary use of this is to correct a mistaken NIC card’s impression of overall network speed. An NIC card connected to a 10 megabit hub on a gigabit network, for example, will think that the entire network is only 1% as fast as it actually is.

Wireless 802.11a/b Tab



This tab is available if the currently selected Probe is an 802.11b wireless device.

> Note that if your wireless network is configured for WEP, you must activate WEP and enter the WEP key(s) in the Edit WEP Keys dialog in Observer, which is described below in this section.

- "Site Profiles"—allows you to save and retrieve wireless parameters, rather than re-keying the parameters every time you change sites.
- "Monitor Traffic By"—the method to monitor traffic. The three available methods are as follows (choose one):
    - Channel— Specify a channel to monitor.
    - BSSID— Specify the Basic Service Set ID of the Access Point you want to monitor.
    - ESSID—Specify the Extended Service Set ID of the network you want to monitor.
    - Scan Channels—(Only available if you have chosen to monitor by Channel) Scan the selected channels. To select channels to scan, click Channel Map...
- WEP Encryption—Choose Wireless Equivalency Privacy encryption settings. To use WEP, check the Use WEP keys to decrypt wireless traffic checkbox and click Edit WEP Keys... to enter the appropriate encryption keys.
- Antenna to use—the type of antenna connected to your system. Specify one of the following:
    - Antenna Diversity—Use the stronger signal from the two antenna ports. This is the recommended setting for the standard snap-on antenna.

- Primary Antenna Only—If you are not using the standard snap on antenna, choose this option if the antenna you are using is connected to the primary antenna port (see your NIC manual for details).

- Secondary Antenna Only—If you are not using the standard snap on antenna, choose this option if the antenna you are using is connected to the secondary antenna port (see your NIC manual for details).

Web Reporting Configuration

See “Configuring Web Publishing Service” on page 396.

Actions Menu

Redirecting Probes

When using Observer with a Probe you can redirect a Probe from one Observer console to another, or from another to the local Observer console. To display the redirection dialog, from the main Observer menu select Actions > Redirect Probe.

Once you connect to the selected Probe, you can choose to redirect the local Probe or to another Observer station.

Probe redirection can be password protected. The password is set on the Probe, from the Options > Probe Options dialog.

> The redirection password is case-sensitive; moxie, Moxie, and MOXIE would all be different passwords.

Notifying a Probe User

Observer provides a chat utility that allows the network administrator to communicate in real time with Probe PC users. Selecting **Actions-> Notify Probe user** will open a chat window on the Probe PC.

This utility is useful if you want to warn a non-dedicated Probe system user that you are going to do something (e.g. Packet Capture) that is processor-intensive.

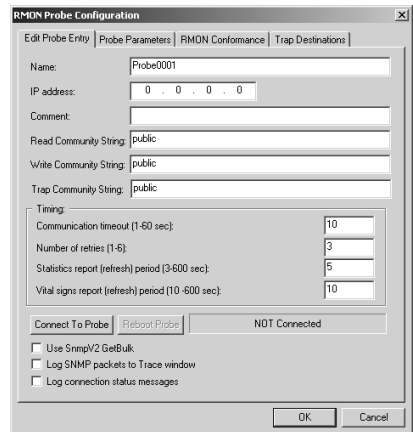
Adding/Configuring an RMON Probe

RMON Console Configuration Options

RMON configuration information is kept in the RMON Probe Configuration dialog. This can be accessed by either right-clicking on the RMON Probe (once you have connected to it) or by selecting Options > Selected Probe or SNMP Device Properties.

RMON Probe Configuration – Edit Probe Entry Tab

This section provides Observer with the basic RMON Probe connection and timing values.



- "Name" textbox—allows you to specify a name that will be listed for the Probe on the list of Probes in Observer.
- "IP address" textbox—allows you to enter the IP address of the RMON Probe.
- "Comment" textbox—allows you to enter any comment that might help identify the Probe. This information will be displayed in the Observer list of Probes.
- "Read Community String" textbox—allows you to enter the Read Community String for the Probe; the default is "public." This string may be considered the "password" string for reading data from this Probe.
- "Write Community String" textbox—allows you to enter the Write Community String for the Probe; the default is "public." This string may be considered the "password" string for writing configuration data to this Probe.
- "Trap Community String" textbox—allows you to enter the Trap Community String for the Probe; the default is "public." This string may be considered the "password" string for writing configuration data to this probe.

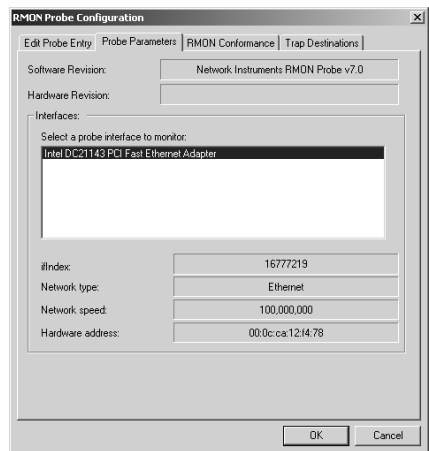
Timing:

- "Communication timeout (1-60 sec)" textbox—allows you to define how long (in seconds) to wait from a response from the Probe.
- "Number of retries (1-6)" textbox—allows you to define how many times to retry communication if no response is received within the Communication timeout period.
- "Statistics report (refresh) period (3-600 sec)" textbox—allows you to define the number of seconds between refreshing RMON tables and modes that display time based statistics.

- “Vital signs report (refresh) period (10-600 sec)” textbox—allows you to define the number of seconds between refreshing the vital signs mode.
- Connect to Probe button—allows you to connect the RMON Probe.
- Reboot Probe button—allows you to reboot the RMON Probe.
- Connection display—displays the connection status of the RMON Probe.
- “Log SNMP packets to Trace window” checkbox—when selected, logs SNMP packets.
- “Log connection status messages” checkbox—when selected, displays any log connection status messages.

RMON Probe Configuration – Probe Parameters Tab

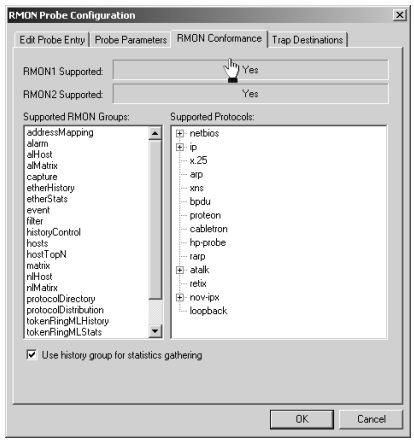
These items are collected directly from the RMON Probe. Selecting the interface (if multiple interfaces are present) will display that interface’s information.



- “Software Revision” display—allows you to view the software revision reported by the Probe.
- “Hardware Revision” display—allows you to view the hardware revision reported by the Probe (if it is hardware-based Probe).
- “Interfaces” list—allows you to view the list of interfaces the Probe is capable of monitoring. You may also select the interface you would like to monitor here. To monitor multiple interfaces, you need to add a separate Probe in Observer using Actions > Add RMON Probe.
- “ifIndex” display—allows you to view the MIB2 interface index number for the interface being monitored.

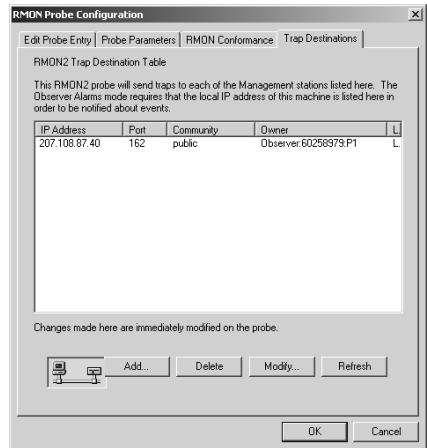
- “Network type” display—allows you to view the network type the Probe is monitoring.
- “Network speed” display—allows you to view the speed of the network as reported by the Probe.
- “Hardware address” display—allows you to view the hardware address of the Probe interface.

RMON Conformance Tab



- “RMON1 Supported” display—allows you to view if RMON1 is supported by the Probe. This determination is made by querying the first 10 RMON table entries. If any one responds, RMON1 is reported to be supported.
- “RMON2 Supported” display—allows you to view if RMON2 is supported by the Probe. This determination is made by querying the groups 11-19 RMON table entries. If any one responds, RMON2 is reported to be supported.
- “Supported RMON Groups” list—displays the groups that the Probe report supports. This report is a (formatted) printout of the RMON probeConfig (group 19) ProbeCapabilities item.
- “Supported Protocols” list—displays the protocols that the Probe report supports. This report is a (formatted) printout of the RMON protocolDir (group 11) protocolDirTable table.
- “Use history group for statistics gathering” checkbox—when selected, the history group is used for gathering statistics.

Trap Destinations Tab



This tab lets you the define SNMP management systems that will receive traps. To add a manager to the list, click the **Add**... button. Both the **Add** and **Edit** let you enter the IP address of the manager you wish to define as a trap destination, as well as its community string and port number. The **Refresh** button causes Observer to query the RMON probe and forward any trap conditions to the management systems listed in the dialog.

Adding, Editing, or Deleting an SNMP Device

See **Adding, Modifying, and Deleting SNMP Agents** on page 339.

Update Switch Scripts

This option updates all switch scripts located at each Probe.

Updating All Probes to Current Observer Version

Choose this option to update all licensed Probes to the current Observer version. After you choose the option, a confirmation dialog is displayed. After you choose **Yes,** all the licensed Observer Probes connected to this Observer console will be updated automatically.

Resetting SNMP Device Alarm Counters

Actions>Reset SNMP Device Alarm Counters resets the alarm counters for the currently active SNMP device. To reset alarm counters for all SNMP Devices, choose **Actions->Reset All SNMP Devices Alarm Counters**.

Real-Time Expert

Overview

Real-Time Expert incorporates all of the features of Observer and adds Observer's Expert system to help identify problems and help determine the best course of action. With Real-Time Expert you can get real-time post capture expert event identification, expert analysis, and modeling of network traffic data.

Real-Time Expert has multiple views to help identify different network problems.

- Expert Summary problem analysis—shows all error events in a single, concise display. For connection-oriented problems, a simple double-click drills down to further analysis.
- TCP/UDP/ICMP Events—displays protocol-based and application-based problems. Local traffic is judged using different criteria than WAN/Internet traffic to help make certain no false readings are provided. All common port-based services are tracked and slow response/no response and slow connect/no connect are flagged and sorted by severity. A generic TCP condition expert tracks all port-based protocols for slow response or connect characteristics.
- IPX Events—displays all communication errors being transferred via Novell.
- NetBIOS Events—displays the number of NetBIOS conditions and events that are being transferred over the network.
- Expert Wireless Events—tracks network conditions between wireless stations and logs a number of events of interest to a wireless network administrator, including the type of error, the sending and receiving stations, and other status information. As with other expert events, detailed explanations are just a click away in Expert Help.
- Time Interval Analysis of any conversation—can be displayed as a "drill-down" from any problem identified in the IP/TCP/UDP Experts. Time Interval Analysis shows network errors organized by time periods to identify whether a problem is sporadic or consistent throughout the day. This information is critical in determining if a problem is spread throughout a period of hours or if it is localized to a specific time span. Network utilization within the Interval Analysis is displayed to help match slow responses with heavy network load.
- Connection Dynamics—provide a graphical view of system conversations. Packet-to-packet delay times are shown visually, allowing instant identification of long latency and response times. Retransmissions and lost packets are flagged in red for quick

identification. Should a particular packet require further investigation, its decode is only a click away.

- Server Analysis—displays a server/device's characteristics and response times charted against the number of simultaneous requests asked of that device. Response times are charted for recorded request sets and plotted for predicted response times as request loads increase.
- "What If" Modeling analysis—starts with measurements based on actual client/server conversations or peer-to-peer conversations, and plots possible response time, utilization, and packet flow scenarios. This allows you to predict network bandwidth and response-time impact for topology changes (e.g., 10MB to 100MB) or by changes in variables such as average packet size, send-to-receive packet ratio, latency, server load, and number of users.

  This "live-modeling" lets you assess the impact of possible network or application changes.

Getting Started with Expert Analysis

To display Expert Analysis, select the **Decode** button from the Packet Capture window and click the Expert Analysis tab.

Configuring Real-Time Expert

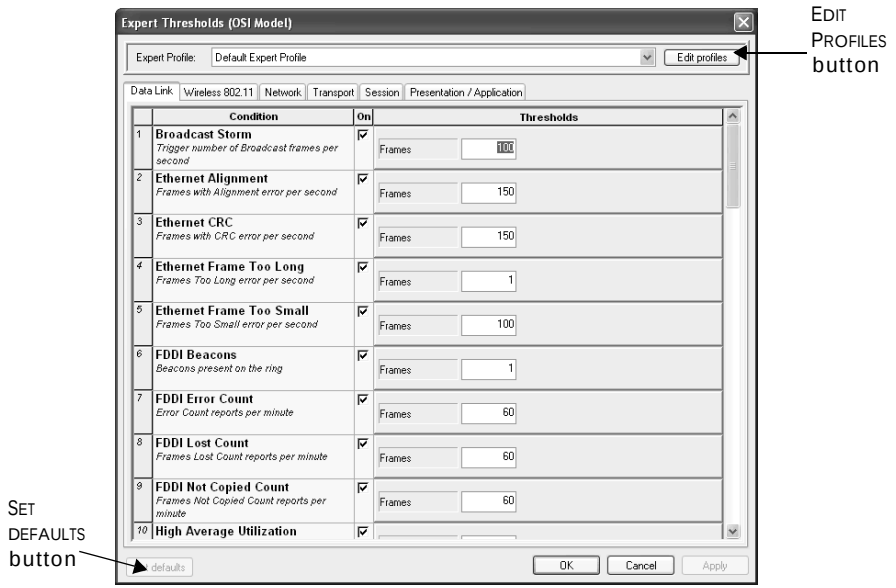
Configuring the Expert system is a two-step process. While it is recommended that all Expert users familiarize themselves with both configuration areas, the Expert system is quite functional for most LANs without any modification of the default configurations.

The two Expert configuration areas are the Expert Item Thresholds and each Expert mode's General Settings.

Expert Thresholds (OSI Model)

To display the Expert Thresholds (OSI Model) configuration display, select Mode Commands > Expert Thresholds (OSI Model) while the Expert window is displayed.

You may also view the Expert Thresholds (OSI Model) display by clicking the Expert Thresholds button.



Expert Thresholds define what parameters are used when determining if a particular event is a problem or not. Thresholds are set for all Expert events, and for some events, more than one threshold is set. For example, for TCP Bad Checksums, only the number of frames during the entire capture process is set. For FTP Session delays, values are set both for slow connect and slow response, as well as values for grading marginal and critical for both. In addition to these, values for network and WAN/Internet response times values are set.

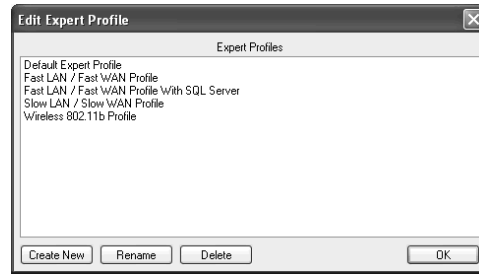
Because of the potentially large number of values that are required and because a number of different network/WAN/Internet configurations dictate predictable value sets, Real-Time Expert Thresholds permit the user to save profiles for sets of values. The Thresholds configuration displays are loosely based on the OSI model, separating different expert items from where in the communications stack the item is found.

Each item can be turned on or off by checking the box in the “On” column. The fewer items that are checked, the less memory used by Observer, and the less processing time will be occupied by the Expert Analysis.

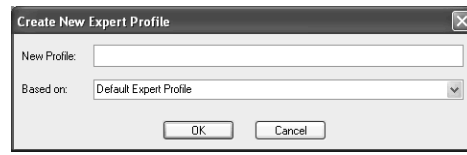
Expert Threshold Profiles

Configuring profiles is started from the top section of the Expert Thresholds (OSI Model) display.

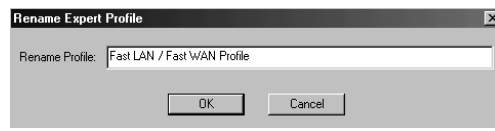
1. Click the **Edit Expert Profile** button to begin the process. This will display the **Edit Expert Profile** dialog.



2. To create a new profile, click on the **Create New** button. The **Create New Expert Profile** dialog will be displayed.



3. When you create a new profile, you may base your new profile on an existing profile. This will populate the new profile with values from the "Based on" profile.
4. To rename an existing profile, highlight the profile and then click on the **Rename** button. The **Rename Expert Profile** dialog will be displayed.



5. To delete an existing profile, highlight the profile and then click on the DELETE button.

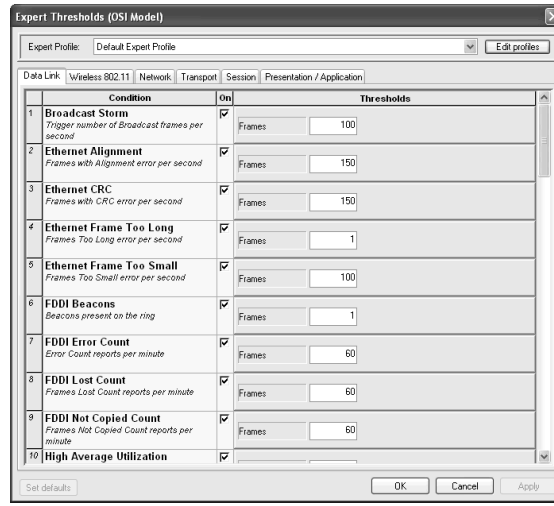
Set Defaults Button

The SET DEFAULTS button will populate all values in the current profile with the values from the Default Expert Profile. Note that the SET DEFAULTS button will be grayed out when the current profile is set to "Default Expert Profile."

Expert Items

Each tab in the Expert Thresholds (OSI Model) display represents a different layer of communication to process for Expert Analysis.

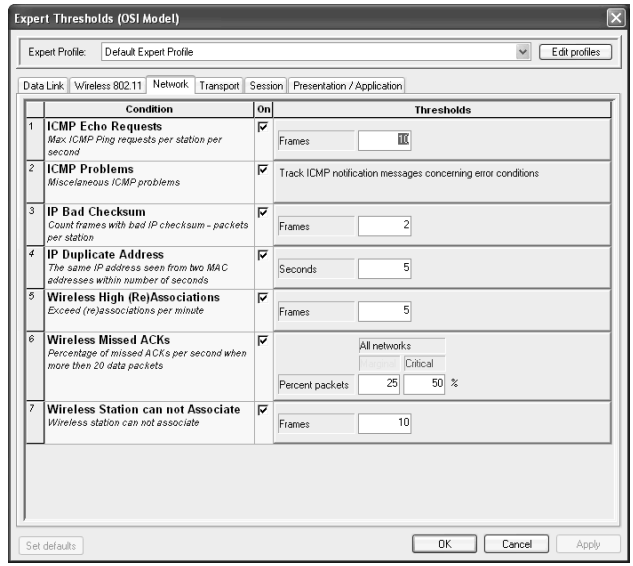
Data Link Tab



- Broadcast Storm—triggers the number of broadcast frames per second.
- Ethernet Alignment—frames with alignment errors per second.
- Ethernet CRC—frames with CRC errors per second.
- Ethernet Frame Too Long—frames with jabber errors per second.
- Ethernet Frame Too Small—frames with runt errors per second.
- FDDI Beacons—beacons present on the ring (total).
- FDDI Error Count—error count total per minute.
- FDDI Lost Count—frames reported lost per minute.
- FDDI Not Copied Count—frames not copied per minute.
- Frame Relay Backward Cong.—the threshold where congestion is considered severe.
- Frame Relay Forward Cong.—the threshold where congestion is considered severe.
- High Average Utilization—critical level of average utilization as a percent, averaged over the current capture.
- High Peak Utilization—critical level of peak utilization as a percent, for the current capture.
- High Retransmissions—exceed number of retransmissions per minute.
- Multicast Storm—trigger number of multicast frames per second.
- TokenRing Abort Delimiter—abort delimiter transmitted reports per minute.
- Token Ring ARI-FCI Errors—ARI-FCI error reports per minute.

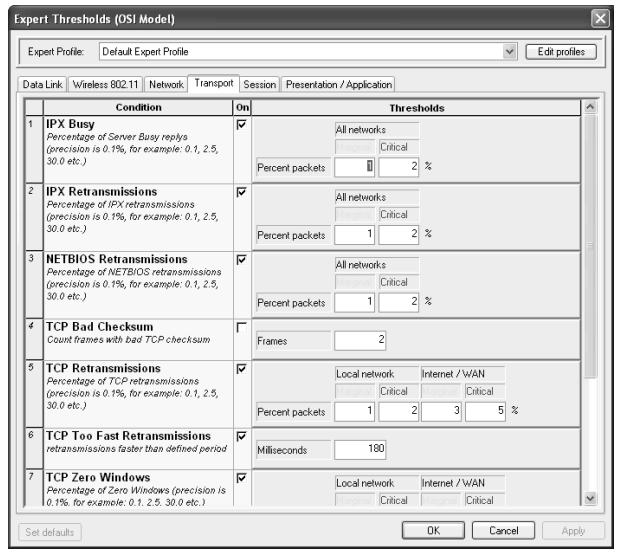
- Token Ring Beacons—number of beacons present on the ring.
- Token Ring Burst Errors—burst error reports per minute.
- Token Ring Frame Copied Errors—frame copied error reports per minute.
- Token Ring Frequency Errors—frequency error reports per minute.
- Token Ring Internal Errors—internal error reports per minute.
- Token Ring Line Errors—line error reports per minute.
- Token Ring Lost Frame Errors—lost frame error reports per minute.
- Token Ring Monitor Errors—monitor error reports per minute.
- Token Ring Receive Congestion—receive congestion error reports per minute.
- Token Ring Purge—ring purge reports per minute.
- Token Ring Token Errors—token error reports per minute.
- Wireless CRC—Percent CRC errors per second exceed limit.
- Wireless Low Quality Per Station—Packets with a signal quality percent less than this.
- Wireless PLCP—Frames with short PLCP error per second.
- Wireless Signal Strength Per Station—Packets with a signal strength percent less than this.
- Wireless WEP—Frames with WEP decode error per second.

Network Tab



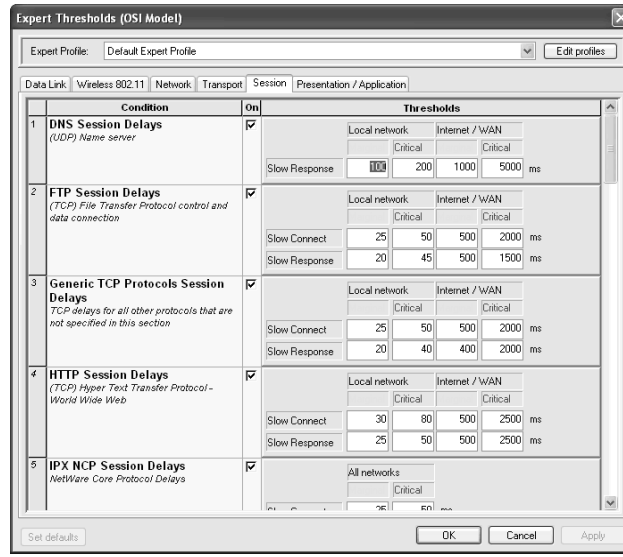
- ICMP Echo Requests—the maximum number of ICMP echo requests (pings) per workstation per second.
- ICMP Problems—enables the tracking and recording of ICMP error messages. When checked, Real-Time Expert will identify ICMP error messages both in the Expert Summary and in the ICMP Events section. When not checked, ICMP events are ignored.
- IP Bad Checksum—counts frames with bad IP checksums. The value is the packets per station for the entire capture or capture period.
- IP Duplicate Address—the same IP addresses seen coming from two different MAC addresses within this number of seconds.
- Wireless High (re)associations—Exceed (re)associations per minute.
- Wireless Missed ACKs—Percentage of missed ACKs per second when more than 20 data packets.
- Wireless Station Can Not Associate—Wireless Station Can Not Associate.

Transport Tab



- IPX Busy—percentage of server busy replies.
- IPX Retransmissions—percentage of IPX retransmissions.
- NETBIOS Retransmissions—percentage of NETBIOS retransmissions.
- TCP Bad Checksum—the count of frames with bad TCP checksum. This is a total for the entire capture or period.
- TCP Retransmissions—percent of TCP retransmissions. Values are required for marginal and critical, as well as for the local network and WAN/Internet traffic. Values can be set from 0.1% to 100%.
- TCP Too Fast Retransmissions—retransmissions faster than the defined period, in milliseconds.
- TCP Zero Windows—percentage of TCP zero window advertised packets. Values are required for marginal and critical, as well as for the local network and WAN/Internet traffic. Values can be set from 0.1% to 100%.
- UDP Bad Checksum—the count of frames with bad UDP checksum. This is a total for the entire capture or period.
- UDP Retransmissions—percent of UDP retransmissions. Values are required for marginal and critical, as well as for the local network and WAN/Internet traffic. Values can be set from 0.1% to 100%.
- Wireless WEP not used—Packets with no WEP on directed data packets with data present.

Session Tab



Session data is compiled for all data associated with a particular port-based conversation. This includes all data packets, acks, etc. This differs from the Presentation/Application Expert events where server application processing times are tracked.

- DNS Session Delays—defines the session response time delay for DNS (UDP) that is considered marginal and critical. Values are required for both the local network and Internet/WAN.
- FTP Session Delays—defines the session response time delay for FTP that is considered marginal and critical. Values are required for the local network and Internet/WAN, and for initial connection (slow connect) as well as for ongoing communications (slow response).
- Generic TCP Protocols Session Delays—defines the session response time delay for all TCP port-based protocols that are not defined specifically that are considered marginal and critical. The port number will be displayed without a name. Values are required for the local network and Internet/WAN, and for initial connection (slow connect) as well as for ongoing communications (slow response).
- HTTP Session Delays—defines the session response time delay for HTTP (Web) that is considered marginal and critical. Values are required for the local network and Internet/WAN and for initial connection (slow connect) as well as for ongoing communications (slow response).
- IPX NCP Session Delays—defines the session response time delay for IPX Network Core Protocol packets that is considered marginal and critical. Values are required for

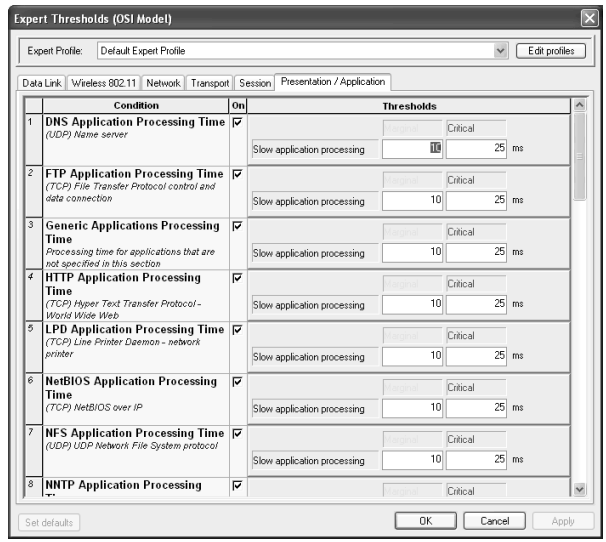
the local network and Internet/WAN and for initial connection (slow connect) as well as for ongoing communications (slow response).

- IPX SMB Session Delays—defines the session response time delay for IPX Server Message Block packets that is considered marginal and critical. Values are required for the local network and Internet/WAN and for initial connection (slow connect) as well as for ongoing communications (slow response)
- LPD Session Delays—defines the session response time delay for LPD that is considered marginal and critical. Values are required for the local network and Internet/WAN, and for initial connection (slow connect) as well as for ongoing communications (slow response).
- IP NetBIOS Session Delays—defines the session response time delay for (IP) NetBIOS that is considered marginal and critical. Values are required for the local network and Internet/WAN, and for initial connection (slow connect) as well as for ongoing communications (slow response).
- NETBIOS Session Delays—defines the session response time delay for NETBIOS that is considered marginal and critical. Values are required for the local network and Internet/WAN, and for initial connection (slow connect) as well as for ongoing communications (slow response).
- NFS Session Delays—defines the session response time delay for NFS that is considered marginal and critical. The port number will be displayed without a name. Values are required for the local network and Internet/WAN, and for ongoing communications (slow response).
- NNTP Session Delays—defines the session response time delay for NNTP (Network News) that is considered marginal and critical. Values are required for the local network and Internet/WAN, and for initial connection (slow connect) as well as for ongoing communications (slow response).
- POP3 Session Delays—defines the session response time delay for POP3 that is considered marginal and critical. Values are required for the local network and Internet/WAN, and for initial connection (slow connect) as well as for ongoing communications (slow response).
- RPC Session Delays—defines the session response time delay for RPC that is considered marginal and critical. Values are required for the local network and Internet/WAN, and for initial connection (slow connect) as well as for ongoing communications (slow response).
- SMTP Session Delays—defines the session response time delay for SMTP that is considered marginal and critical. Values are required for the local network and Internet/WAN, and for initial connection (slow connect) as well as for ongoing communications (slow response).
- SNMP Session Delays—defines the session response time delay for SNMP that is considered marginal and critical. The port number will be displayed without a name.

Values are required for the local network and Internet/WAN, and for ongoing communications (slow response).

- TCP SYN Requests—the number of sync frames seen per second.
- Telnet Session Delays—defines the session response time delay for Telnet that is considered marginal and critical. Values are required for the local network and Internet/WAN, and for initial connection (slow connect) as well as for ongoing communications (slow response).
- User Defined [1-5] Session Delays—defines the session response time delay for user defined port-based TCP protocols that are considered marginal and critical. Protocols are defined by Port and Name. Values are also required for the local network and Internet/WAN, and for initial connection (slow connect) as well as for ongoing communications (slow response).

Presentation/Application Tab



- DNS Application Processing Time—defines the application processing time delay for DNS (UDP) that is considered marginal and critical.
- FTP Application Processing Time—defines the application processing time delay for FTP that is considered marginal and critical.
- Generic Applications Processing Time—defines the application processing time delay for all TCP port-based protocols that are not defined specifically that are considered marginal and critical. The port number will be displayed without a name.
- HTTP Application Processing Time—defines the application processing time delay for HTTP (web) that is considered marginal and critical.

- LPD Application Processing Time—defines the application processing time delay for LPD that is considered marginal and critical.
- NetBIOS Application Processing Time—defines the application processing time delay for NetBIOS that is considered marginal and critical.
- NFS Application Processing Time—defines the application processing time delay for NFS that is considered marginal and critical.
- NNTP Application Processing Time—defines the application processing time delay for NNTP that is considered marginal and critical.
- POP3 Application Processing Time—defines the application processing time delay for POP3 that is considered marginal and critical.
- POP3 Login Failures—defines the application processing login failures.
- RPC Application Processing Time—defines the application processing time delay for RPC that is considered marginal and critical.
- SMTP Application Processing Time—defines the application processing time delay for SMTP that is considered marginal and critical.
- SMTP Login Failures—defines the application processing SMTP login failures.
- SNMP Application Processing Time—defines the application processing time delay for SNMP that is considered marginal and critical.
- TDS Dataset Not Found—defines the application processing TDS dataset not found.
- TDS Login Failures—defines the application processing TDS login failures.
- TDS Timeout—defines the application processing TDS timeout.
- Telnet Application Processing Time—defines the application processing time delay for Telnet that is considered marginal and critical.
- User Defined [1-5] Application Processing Time—defines the application processing time delay for user-defined port-based TCP protocols that are considered marginal and critical. Protocols are defined by port and name.
- VoIP Jitter—defines the application processing VoIP jitter.
- VoIP Percent Lost—defines the application processing VoIP percent lost.

Using Real-Time Expert

Real-Time Expert analyzes all captured packets and each captured packet's contents in order to identify problems.

Functional Overview

There are a number of ways to approach a network problem with Real-Time Expert. As with any network problem, you should first determine if you can reproduce the problem. If you can reproduce the problem, set up a capture to collect data for the entire event (start to finish) and then use the Expert in post capture mode to identify possible causes of the event. Each section of the Expert is designed to shed light on different possible problems.

If the problem cannot be reproduced, it is often possible to run the Expert in real-time analysis mode to see if you can gather more information about the problem when it happens, or if there are other, more general, network problems occurring that could be influencing your network performance.

In addition to finding the source of a problem, Real-Time Expert also offers a number of modeling features designed to help predict what changes on your network/WAN's configuration (e.g., from 10MB to 100MB) to response time or bandwidth utilization. This "live modeling" is based on a sample of your network data and projections can be made to simulate more users or slower WAN connects.

Expert Summary, Expert Events, and Expert Analysis

Real-Time Expert is divided into three areas: Expert Summary, Expert Events, and Expert Analysis.

- Expert Summary—a collection of critical events from the various Expert Events sections, as well as a display of non-TCP based events (e.g., a CRC or alignment error).
- Expert Events—break down the IP conversations into subprotocol groups of TCP, UDP, and ICMP. In the case of TCP and UDP, the conversations are further broken down by application. Each conversation is graded based on a user-defined threshold for a number of conditions.
- Expert Analysis—takes the analysis of Expert Events to the next level. A number of different types of views can be displayed for each conversation displayed in the Expert Events sections. Typically, these displays are accessed by right-clicking on the conversation in question and choosing the form of analysis required.

Real-Time and Post-Capture Analysis

The Expert system within Observer can be used either in real-time or post-capture. Once data has been captured, a number of different, related displays are available to help isolate and identify problems.

Real-Time Analysis

Real-Time Expert Analysis can identify problems as they happen. In general, you would run Observer's Packet Capture and view the Expert Summary as the capture is taking place. Since real-time processing can involve a tremendous amount of data, it is possible that Observer may get behind in processing packets. It is important to know what percentage of the packets have been processed; therefore, the Expert displays this information on the display header.

The header shows the number of packets captured, the number of packets processed, and the percent of packets processed. Expert Analysis of packets is done at a lower priority than actual capture: Observer will first try to maintain full line rate capture, and then process the Expert Analysis during lulls in the capture of data.

There are a number of considerations when doing real-time analysis. The first decision is whether to use a circular or a static buffer. This decision should be based on the amount of available RAM on your system that can be used for the Observer capture buffer. You will also want to calculate whether the buffer will be large enough to capture the data required to analyze the event.

If you have a large amount of RAM, you may want to assign the largest buffer possible and run the Expert in real-time, collecting all packets and data. When using the Expert in this situation, the Expert Summary, Expert Events, and Expert Analysis all will be available.

If the amount of RAM available for the Observer buffer is not large or is not large enough to capture the event in question or for the amount of time required to view the conditions in question, you should set Observer to capture using a circular buffer. In this case, Observer will capture packets until the buffer is full and then add new packets to the buffer while removing the oldest packets. As this process continues, the Expert Summary and Expert Events sections will continue to collect totals for events.

> After some period of time, the Expert Events dialogs begin to remove non-critical events based on the user-supplied settings in the General tab under Expert Global Settings.

Post-Capture Analysis

Post-capture analysis can be done on an Observer capture buffer or Sniffer® buffer. Often a capture from a remote site will be forwarded to an individual with Real-Time Expert for analysis. Post capture Expert Analysis does not have any of the buffer limitations of real-time analysis.

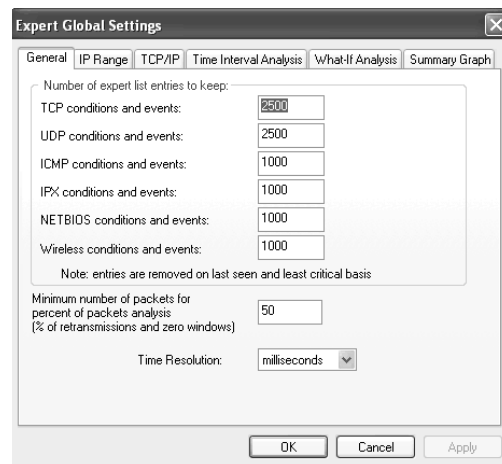
Expert Global Settings

Real-Time Expert Global Settings allow configuration of the different expert modes and other items that are used in all Real-Time modes.

To access the Expert Global Settings dialog, either select the Expert Global Settings item from Mode Commands (when in Packet Capture View with the Expert Analysis tab selected) or click the EXPERT SETUP icon .

Expert Global Settings – General Tab

These values define how many items Real-Time Expert will keep in memory at any one time.



Number of Expert list entries to keep:

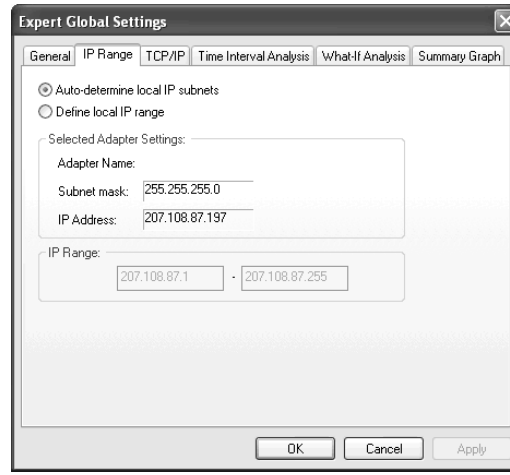
- “TCP conditions and events” textbox—defines the number of TCP items that will be tracked. An item is defined as a conversation on a particular port. Note that if you compact multi-port conversations into a single conversation (set in the TCP/IP tab), the number of items does not change. A higher value will result in more system memory usage; a lower value will use less memory usage. The default value is 1000.
- “UDP conditions and events” textbox—defines the number of UDP items that will be tracked. An item is defined as a conversation on a particular port. Note that if you compact multi-port conversations into a single conversation (set in the TCP/IP Tab), the number of items does not change. A higher number will result in more system memory usage; a lower number will use less memory. The default value is 1000.
- “ICMP conditions and events” textbox—defines the number of ICMP items that will be tracked. An item is defined as a single ICMP message. A higher value will result in more system memory usage; a lower value will use less memory. The default value is 1000.

  Entries are removed based on a last-seen and least-critical basis—first the oldest non-critical items are removed, then the oldest critical items.

- “IPX conditions and events” textbox—defines the number of IPX conditions and events that will be tracked.
- “NETBIOS conditions and events” textbox—defines the number of NETBIOS conditions and events that will be tracked.
- “Minimum pkts for % of packets analysis (% of retransmissions and zero windows)” textbox—defines the minimum number of packets to be present before any identification of retransmissions and zero window calculations are made.

Expert Global Settings – IP Range Tab

These items define how Real-Time Expert identifies which conversations are local (network) and which conversations are from the WAN or Internet.



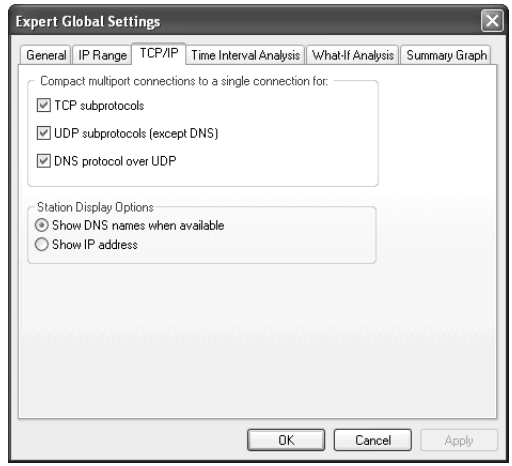
- Auto-determine local IP subnets option button—when selected, Observer will (attempt to) automatically determine the local subnet. This is done by identifying your local adapter and using the configured IP address and subnet mask. When this information is identified, Observer assumes your local IP range to be within your subnet.
- Define local IP range option button—when selected, allows you to enter a specific IP address range to use as the local range.

Selected Adapter Settings:

- "Adapter Name" display—allows you to view the adapter name.
- "Subnet mask" display—allows you to view the subnet mask.
- "IP Address" display—allows you to view the IP address.
- IP Range textboxes—allows you to enter an IP range; only active when the Define local IP range option button is selected.

Expert Global Settings – TCP/IP Tab

These items define how IP conversations will be identified.



Compact multiport connections to a single connection for:

- "TCP subprotocols" checkbox—when selected, multi-port conversations (for the same pair) will be shown as one conversation. In this case, each port-based Expert event for the conversation pair will be summed and displayed as a total (of all items) seen on all ports for that conversation.

  When not selected, every port will be listed as a separate line and displayed as a separate conversation item.

- "Show undetermined TCP protocols as one connection" checkbox—when selected, port-based protocols that are not identified by Observer are collected into one conversation display line.

- "UDP subprotocols (except DNS)" checkbox—when selected, multi-port conversations will be shown as one conversation. In this case, each port-based expert event for the conversation pair will be summed and displayed as a total (of all items) on all ports for that conversation.

  When not selected, every port will be listed as a separate line and displayed as a separate conversation.

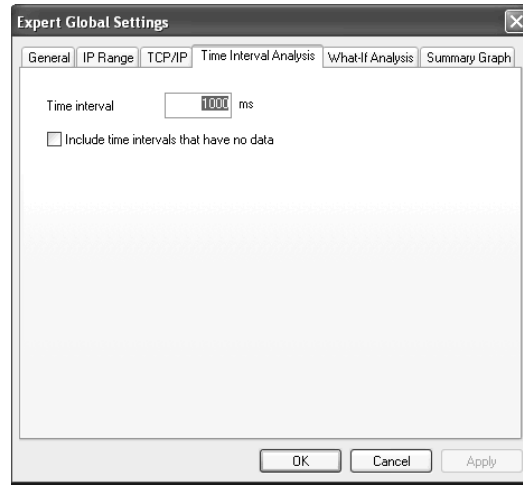
- "Show undetermined UDP protocols as one connection" checkbox—when selected, port-based protocols that are not identified by Observer will be collected into one conversation display line.

- "DNS protocol over UDP" checkbox—by default, this box is checked to compact DNS requests into one conversation. (DNS conversations are treated separately in Real-Time Expert. The reason for this is that Observer sends many DNS packets in an attempt to resolve all IP addresses in all list boxes; if DNS was not compacted, there

would be as many separate conversations recorded for the Real-Time Expert system as there are IP addresses collected. It is possible to not have “other” (non-DNS) conversations shown separately, but to still have the DNS compacted.)

Expert Global Settings – Time Interval Analysis Tab

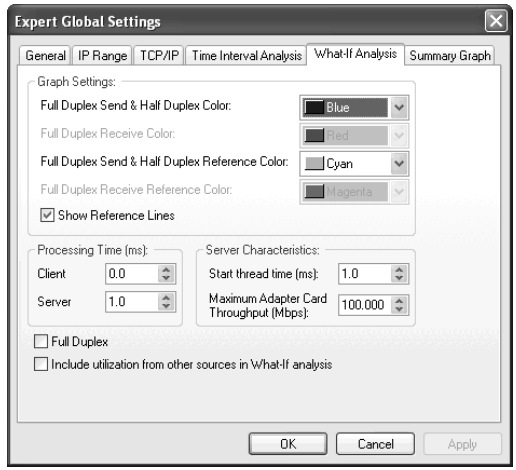
This setup dialog defines the time interval for the Time Interval Analysis.



- “Time interval (ms)” textbox—allows you to set the amount of time (in milliseconds) to split any conversation into when viewing the Time Interval Analysis mode. The default is 1000ms (1 second).
- “Include time intervals that have no data” checkbox—when selected, all time intervals will be displayed regardless of whether data has been collected or not. When not selected, time intervals without data will not be displayed.

Expert Global Settings – What-If Analysis Tab

This dialog sets the default items for the What-If Analysis display.



Graph Settings:

- "Full Duplex Send & Half Duplex Color" dropdown—allows you to define the color of the graph line for sent data. For full duplex, this is only the "send" color. For standard networks (half duplex), this defines both "send" and "receive" colors.
- "Full Duplex Receive Color" dropdown—allows you to define the color of the graph line for full duplex receive sent data; only active if the "Full Duplex" checkbox is selected.
- "Full Duplex Send & Half Duplex Reference Color" dropdown—allows you to define the color of the reference graph line for sent data. The reference line shows the original value prior to modifying any of the modeling values. For full duplex, this is only the reference send color. For standard networks (half duplex), this defines both send and receive reference colors.
- "Full Duplex Receive Reference Color" dropdown—allows you to define the reference color of the graph line for full duplex receive sent data. The reference line shows the original value prior to modifying any of the modeling values.
- "Show Reference Lines" checkbox—allows you to select a reference line to be displayed when any value in the live modeling sections are changed. The reference line shows the original value prior to modifying any of the values.

Processing Time (ms):

- "Client" spinbox—allows you to set the default client processing time. Client processing time is the amount of time the client requires (on average) to process a request and to respond.

- “Server” spinbox—allows you to set the default server processing time. Server processing time is the amount of time the server requires (on average) to process a request and to respond.

Server Characteristics:

- “Start thread time (ms)” spinbox—allows you to set the amount of time it takes to process a thread on the server. This is only taken into account when the Server Type item (selected in the What-If display) is defined as “Web.”
- “Maximum Adapter Card Throughput (Mbps)” spinbox—allows you to define the server’s maximum throughput. This is only taken into account when the Server Type item (selected in the What-If display) is defined as “Ftp.” This may be the rated utilization of the adapter, but most likely it is some fraction of the maximum theoretical utilization of the network.

  One way to get a value for this option is to run Observer on the server using the packet generation mode and setting the generation rate very high. You can then view the utilization that the server can create using Observer’s utilization modes. The maximum utilization will reflect the NIC card’s ability to generate traffic.

- “Full Duplex” checkbox—when selected, the Expert will assume (by default) that the connection is full duplex.
- “Include utilization from other sources in What-If Analysis” checkbox—when selected, in addition to the selected pair’s utilization, the other network utilization is added to all calculations. Thus, the utilization is the pair’s utilization plus the other utilization or the total utilization. When not checked, only the selected pairs’ utilization is used in calculations.

Expert Displays

Real-Time Expert is displayed in two ways:

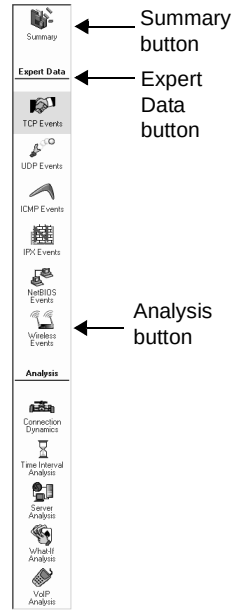
- Opening a (previously captured) buffer and selecting the “Expert Analysis” tab at the bottom of the decode display, or
- Capturing packets and selecting the View icon from Packet Capture. Then select the “Expert Analysis” tab at the bottom of the decode display.

By default, the Expert Summary will be displayed when the Expert is opened.

Expert functionality is accessed through the use of the button bar on the left of the display and through the use of double clicks and right clicks on different items. Typically, where only one choice is available, a double click will “drill-down” for more information on an item (e.g., on items in the Summary display). When multiple choices are available, a right-click will offer a menu to select the choice (e.g., on items in the TCP Events display).

Expert Button Bar

The Expert button bar has three sections: Summary, Expert Data, and Analysis.



The Summary and Expert Data sections can be accessed by selecting either the SUMMARY or EXPERT DATA buttons. Within the Expert Data buttons, there are options for TCP Events, UDP Events, and ICMP Events. Additionally, you may “drill-down” from the Summary section to any of the Expert Data sections by double-clicking on the identified problem.

For most Analysis functions, access is a two-step process.

1. Select a pair (or conversation) in one of the Expert Data sections and click on it.
2. Click the START icon to start the analysis.

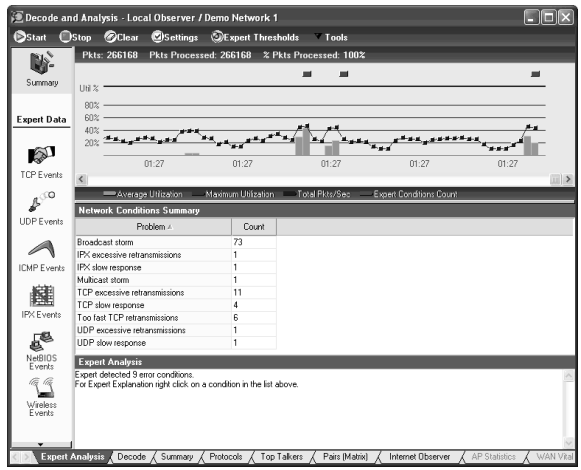
Note that some Analysis modes offer a number of ways to view the conversation. Once this selection has been made for a particular conversation, you can review the Analysis for the last chosen conversation by selecting the ANALYSIS button on the button bar.

Expert Summary

The Expert Summary offers a summation of Expert Events seen in real-time or any events seen in a previously captured buffer.

The Summary is typically the first place to begin using the Expert. Once a general set of metrics is identified with respect to the network or capture, the next steps in pinpointing the problem usually become obvious.

The Summary displays the general problems reported and how many times the problem has been identified. The Expert Analysis display pane at the bottom of the window offers general instructions on what options are available in the display and may offer a short explanation of the highlighted item.



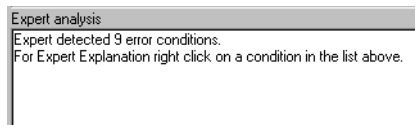
As with all Expert displays, the far left button bar is the standard Packet Capture View bar and can be accessed either by selecting a button or by using Start Modes.

Expert Events

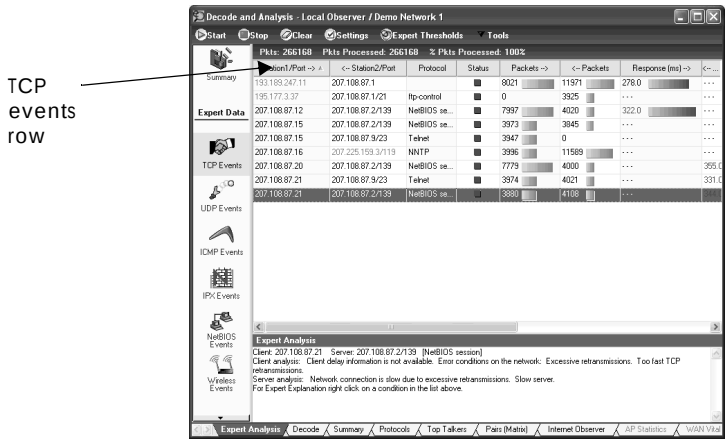
TCP Events

The TCP Events display shows each conversation based on protocol, port, or by station to station conversation. Columns display the protocol, status, number of packets in each direction, packet delay in each direction, the number of retransmissions in each direction, any zero TCP windows advertised in each direction, and an “other” section.

Highlighting any pair will display Expert Analysis in the “Expert Analysis” pane at the bottom of the display.


Expert analysis
Expert detected 9 error conditions.
For Expert Explanation right click on a condition in the list above.

Analysis is offered for both client and server.



TCP Events Row Definitions

Station Columns:

- First “Station/Port->” column—displays the client in any conversation.
- Second “<-Station/Port” column—displays the server in any conversation, if it can be identified.

  Station column ports are displayed based on the setting chosen in the “Expert Global Settings.” See “Expert Global Settings” on page 283.

  By default, conversations will be identified by server port and application.
- Protocol—application protocols are displayed, if known. If the port used is unknown to Observer, this column will be blank.
- Status—displayed as red, yellow, or green.
  - Red—indicates a critical problem.
  - Yellow—indicates a marginal problem.
  - Green—indicates no problems.

  Settings for critical and marginal are set in the “Expert Threshold (OSI Model)” setup dialog. See “Expert Thresholds (OSI Model)” on page 270.
- Packets—displays the number of packets seen in each direction.
- Delay (ms)—calculates in each direction as an overall average of the delay within the protocol. Only delay between data sent and acknowledgment is used for the calculation.

  Whether the delay is judged critical or marginal is considered differently for local data and for Internet/WAN data. This is to make certain that no false critical or

marginal values are displayed for Internet/WAN data that may naturally be slower than local response time data.

Each level, for critical or marginal and for Local or Internet/WAN, are setup in the "Expert Threshold (OSI Model)" setup dialog. See "Expert Thresholds (OSI Model)" on page 270.

- Retrans—displays by conversation and direction.

  Thresholds are set in the "Expert Threshold (OSI Model)" setup dialog under "Transport" and "TCP Overall Retransmissions." See "Expert Thresholds (OSI Model)" on page 270.

- Zero Wnd—displays by conversation and direction.

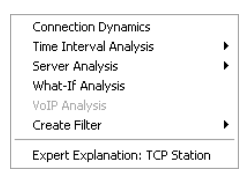
  Thresholds are set in the "Expert Threshold (OSI Model)" setup dialog under "Transport" and "TCP Zero Window." See "Expert Thresholds (OSI Model)" on page 270.

- Other—displays other error conditions. These include slow connection on the specific protocol and slow response on the specific protocol or conversation.

  As with other columns, the thresholds for these items can be found in the "Expert Threshold (OSI Model)" setup dialog under "Session" for most common TCP applications and under "Transport" and "TCP Overall Conditions." See "Expert Thresholds (OSI Model)" on page 270.

TCP Events Right-Click Menu

Highlight any TCP conversation and right click to display the right click menu with options for further analysis on the specific conversion.



- Connection Dynamics—sends the conversation information to the Connection Dynamics display. See "Connection Dynamics" on page 297.

- Time Interval Analysis—sends the conversation information to the Time Interval Analysis display. See "Expert Global Settings – Time Interval Analysis Tab" on page 287.

  The Time Interval Analysis option has a sub-menu that allows you to select how you would like to view the conversation. Options are:

  - Station1/Port <-> Station2/Port—sends conversation data to Time Interval Analysis for the specific station/port conversation.

- Station1/Port <-> Local network—sends conversation data (by port) for Station1 and all other stations on the local network. The local network is defined in the “Expert Global Settings” dialog under the “IP Range” tab. See “Expert Global Settings – IP Range Tab” on page 285.
- Station1/Port <-> Internet/WAN—sends conversation data (by port) for Station1 and all other stations found from the Internet/WAN. The Internet/WAN network is defined in the Expert Global Settings dialog. See “Expert Global Settings – IP Range Tab” on page 285.
- Station1 <-> Station2—sends conversation data for Station1 and Station2 (all ports).
- Station1 <-> Local Network—sends conversation data (all ports) for Station1 and all other stations on the local network. The local network is defined in the “Expert Global Settings” dialog under the “IP Range” tab. See “Expert Global Settings – IP Range Tab” on page 285.
- Station1 <-> Internet/WAN—sends conversation data (all ports) for Station1 and all other stations found from the Internet/WAN. The Internet/WAN network is defined in the “Expert Global Settings” dialog under the “IP Range” tab. See “Expert Global Settings – IP Range Tab” on page 285.
- The same descriptions apply for all “Station2” references.

- Server Analysis—sends the conversation information to the server display.
- What-If Analysis—sends the conversation information to the What-If Analysis live modeling display.

  The What-If Analysis is only displayed if there is server delay information available.

- VoIP Analysis—sends the conversation information to the VoIP Analysis display.
- Expert Explanation: TCP Station

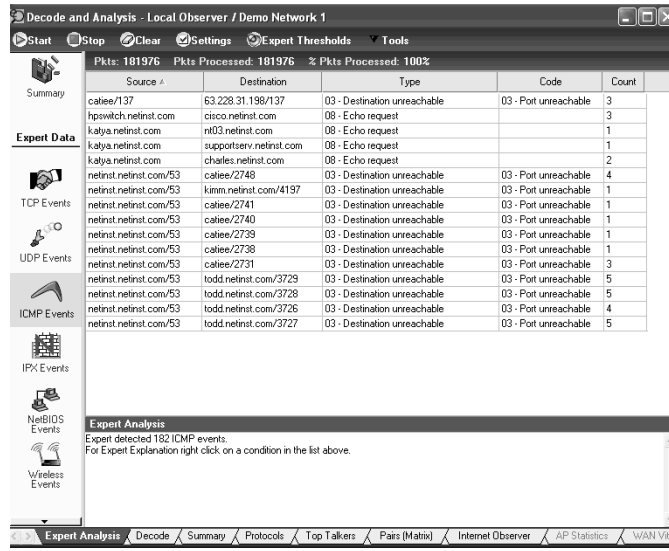
  Note: Expert Explanation is context-sensitive to the specific column where you right-click. For example, if you right-click on the “Delay (ms)” column, you will be offered Expert Explanation on “TCP Delay.” If you right-click on the “Retrans” column, you will be offered Expert Explanation on “TCP retransmissions.”

UDP Events

The UDP Events section is identical to the TCP Events section, only it reports on UDP protocols. See “TCP Events Row Definitions” on page 292.

ICMP Events

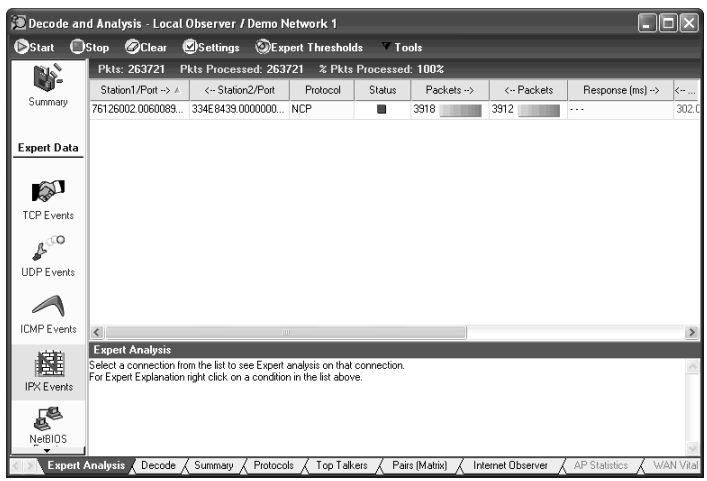
The ICMP Events dialog tracks ICMP errors and reports the error, station, port, and number of occurrences of the error.


Decode and Analysis - Local Observer / Demo Network 1
Start
Stop
Clear
Settings
Expert Thresholds
Tools
Pkts: 181976 Pkts Processed: 181976 % Pkts Processed: 100%
Summary
Expert Data
TCP Events
UDP Events
ICMP Events
IPX Events
NetBIOS Events
Wireless Events
Source
Destination
Type
Code
Count
catiee/137 63.228.31.198/137 03 - Destination unreachable 03 - Port unreachable 3
hpswitch.netinst.com cisco.netinst.com 08 - Echo request 3
katya.netinst.com nt03.netinst.com 08 - Echo request 1
katya.netinst.com supportserv.netinst.com 08 - Echo request 1
katya.netinst.com charles.netinst.com 08 - Echo request 2
netinst.netinst.com/53 catiee/2748 03 - Destination unreachable 03 - Port unreachable 4
netinst.netinst.com/53 kimm.netinst.com/4197 03 - Destination unreachable 03 - Port unreachable 1
netinst.netinst.com/53 catiee/2741 03 - Destination unreachable 03 - Port unreachable 1
netinst.netinst.com/53 catiee/2740 03 - Destination unreachable 03 - Port unreachable 1
netinst.netinst.com/53 catiee/2739 03 - Destination unreachable 03 - Port unreachable 1
netinst.netinst.com/53 catiee/2738 03 - Destination unreachable 03 - Port unreachable 1
netinst.netinst.com/53 catiee/2731 03 - Destination unreachable 03 - Port unreachable 3
netinst.netinst.com/53 todd.netinst.com/3729 03 - Destination unreachable 03 - Port unreachable 5
netinst.netinst.com/53 todd.netinst.com/3728 03 - Destination unreachable 03 - Port unreachable 5
netinst.netinst.com/53 todd.netinst.com/3726 03 - Destination unreachable 03 - Port unreachable 4
netinst.netinst.com/53 todd.netinst.com/3727 03 - Destination unreachable 03 - Port unreachable 5
Expert Analysis
Expert detected 182 ICMP events.
For Expert Explanation right click on a condition in the list above.
Expert Analysis
Decode
Summary
Protocols
Top Talkers
Pairs (Matrix)
Internet Observer
AP Statistics
WAN Vital

For specific explanations of each ICMP error, right-click on the error in question and select “Expert Explanation.”

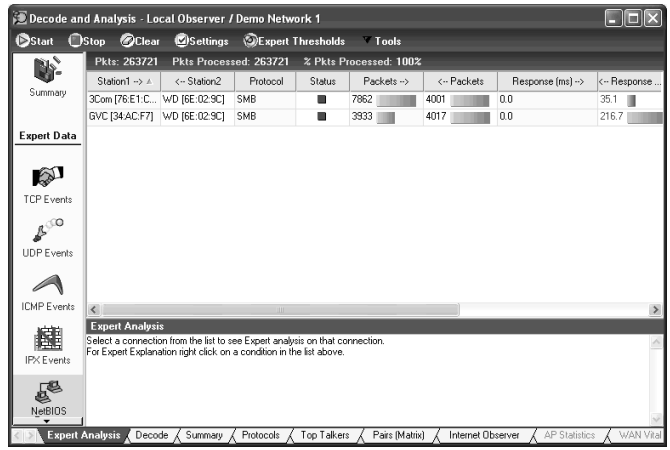
IPX Events

The IPX Events dialog tracks IPX communication errors. Columns display the protocol, status, number of packets in each direction, packet delay in each direction, and the number of retransmissions in each direction.



NetBIOS Events

The NetBIOS Events dialog tracks NetBIOS communication errors. Columns display the protocol, status, number of packets in each direction, packet delay in each direction, and the number of retransmissions in each direction.



Wireless Events

The Wireless Events dialog tracks wireless communication errors. Columns display the station, status, number of packets in each direction, associations in each direction., as well as various error counts from each direction.

Generating Reports in MS Word Format

You can configure and generate an MS-Word format expert analysis report that can be as detailed or concise as needed. Click the Tools button and choose **Create Expert Report in MS-Word format...**

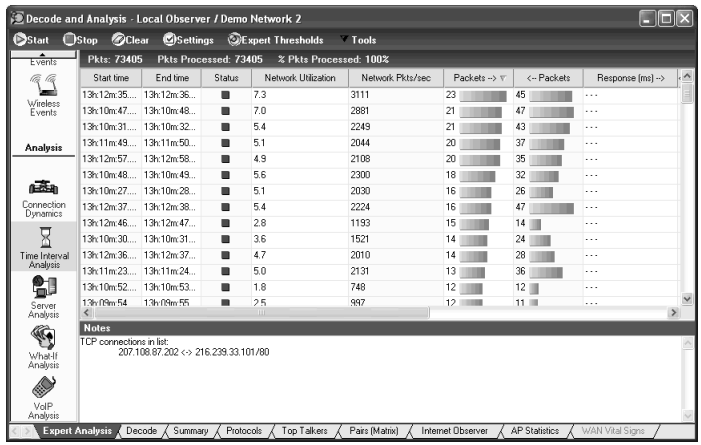
A wizard then displays a series of dialogs that let you configure what will be included in the report and the pathname under which it will be saved.

Expert Analysis

Time Interval Analysis

The Time Interval Analysis displays TCP or UDP Event conversations in a table format showing the conversation split up by the user-defined time period.

To access the Time Interval Analysis display, right-click on a conversation in either the TCP Events or the UDP Events. Select TIME INTERVAL ANALYSIS and then choose your connection option. See “TCP Events Right-Click Menu” on page 293.



Time periods can be defined by either right-clicking on the display and selecting “Properties,” or by selecting the “Time Interval Analysis” tab from the “Expert Global Settings” display.

Columns include Network Utilization and Network Packets/sec to help determine, for each Time Interval Analysis, what the overall network conditions were and how that may have affected the errors observed.

> If you are not seeing any values under Network Utilization, make sure that you have the option to collect “Expert Load Information Packets” checked on in the Packet Capture setup.

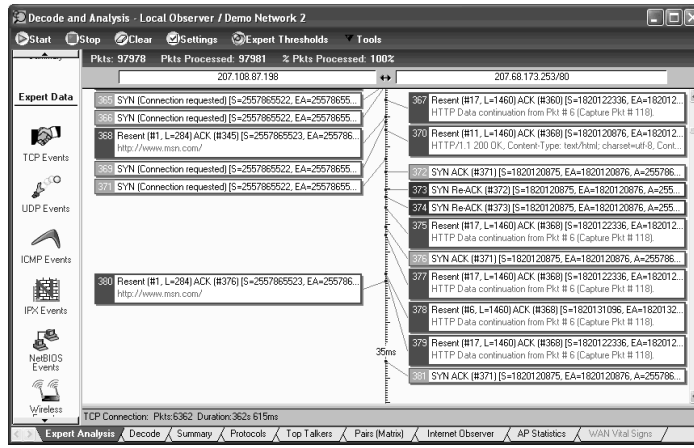
The “Notes” section displays the type of conversation and the stations listed.

Connection Dynamics

Connections Dynamics show a selected conversation graphically illustrating the inter-packet delay as a spacing between packets. Packet-to-packet delay times are shown graphically, allowing instant identification of long latency and response times.

Retransmissions and lost packets are flagged in red for quick identification. The packet display can contain either a brief or detailed view of each packet's contents.

To access Connection Dynamics, right-click on a conversation in either the TCP Events or the UDP Events and select CONNECTION DYNAMICS. Once a conversation has been displayed in Connection Dynamics, it can be reviewed by clicking the CONNECTION DYNAMICS button on the Expert button bar.



The Connection Dynamics display consists of the graphical display and a status bar that changes as you hover your mouse over a particular packet. When no packet is under the mouse, the status bar displays the type of conversation in the display (TCP or UDP), the conversation's duration (in seconds), and packet count.

Connection Dynamics Packet Color Code

The packet square under the mouse cursor will always be blue. When a packet is not under the mouse cursor, the color of the packet squares and accompanying packet frame gives information about the packet.

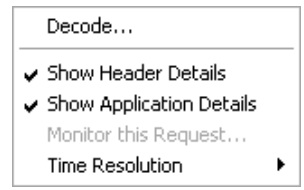
Packets will be colored according to the following rules:

- Gray—a normal response time. Real-Time Expert believes that there is no problem with this packet.
- Purple—a possible problem. While Real-Time Expert does not believe that there is necessarily a problem with this connection, it bears further examination by the network administrator to see if there might be a problem, particularly if there are several purple-coded packets.
- Red—a definite problem, in terms of response time, CRC error, skipped packets, excessive retransmission, or other functionality. Real-Time Expert believes that there is a problem with this packet, and the network administrator should investigate to

determine if the problem with this connection is temporary and transient, or indicates a more serious problem on the network.

Connection Dynamics Right-Click Menu

The Connection Dynamics right-click menu offers display options and access to a packet's decode.

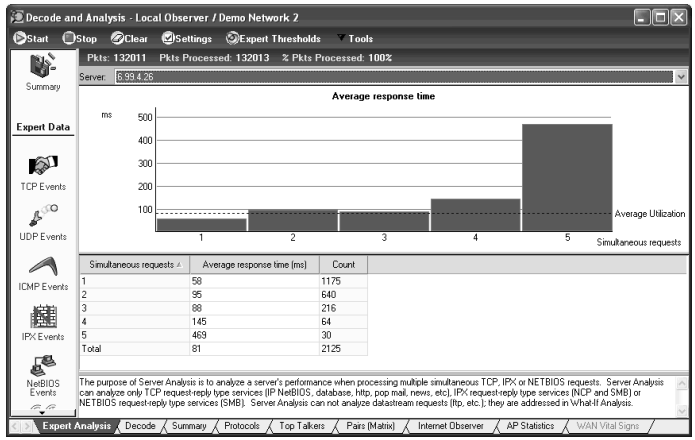


- Decode—displays the decode of the selected packet.
- Show Header Details—toggles the display of packet details. When details are not being displayed, each packet's details can be seen in the Connection Dynamics status bar by hovering the mouse over a packet.
- Time Resolution—zooms in and out showing the packet spacing (timing) on different pixel scales.

Server Analysis

The Server Analysis displays are designed to help evaluate a server's or system's response time under various load scenarios.

The "server" in Server Analysis can be selected in a number of ways. From either the TCP Events or UDP events, right-clicking on any conversation will offer access to Server Analysis for either station in the right-click menu, or by clicking the SERVER ANALYSIS button and selecting the server from the dropdown list at the top of the display.



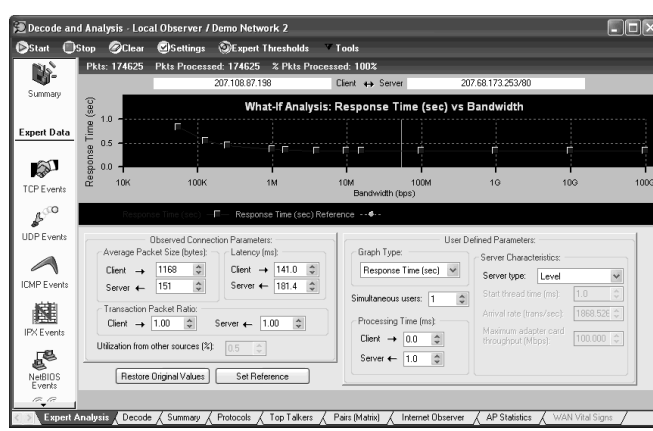
The graph on the top of the Server Analysis display shows the response times for each level of simultaneous requests. An average line is shown for baselining purposes.

What-If Analysis

What-If live modeling and analysis offers both a predictive tool for modeling potential response times, utilizations, or packets per second at different network speeds, and also permits you to change different conversational and network metrics to predict changes in performance with the new values.

The What-If Analysis starts with a conversation collected from your network and bases all predictions on your actual network data. Different system formulas are used for different types of systems to be modeled.

To begin your What-If live modeling session, right-click on a conversation from either the TCP or UDP Events display and select WHAT-IF ANALYSIS.



You can only do What-If modeling on conversations that have a recorded server (the second address in any conversation) delay.

The top of the display will show which stations are currently being modeled. The client is on the left, the server is on the right.

The X-axis of the graph will always display different network speeds. If the data collected was from Observer, a vertical reference line will be displayed showing the network speed at which the data was collected.

The Y-axis will display different values depending on the graph type selected.

A key display will show the different items on the graph and their associated colors.

The items below the graph initially represent the actual data from the captured conversation. Items can be changed to model changes in the network.

Observed Connection Parameters (derived directly from the conversation data collected):

- Average Packet Size (Bytes)—displays the average size of the packets sent from the client and the server. Changing these values in the Client or Server spinboxes will model changes in network performance.
- Latency (mSec)—displays the average latency time as observed in the transaction conversation. Values are shown for packets sent from the client and the server. Changing these values in the Client or Server spinboxes will model changes in network performance.
- Transaction Packet Ratio—displays the transaction packet ratio of the packets sent from the client and the server.
- “Utilization from other sources (%)” spinbox—sets the network utilization to simulate. This would be in addition to the current conversational conditions recorded, and only changes the modeled values if the option to “Include utilization from other sources in What-If Analysis” is checked in the Expert Global Settings, What-If tab setup.

User-Defined Parameters are initially set in the Expert Global Settings, What-If tab. Changing the values here will only affect the current calculation and will not be preserved for subsequent modeling sessions.

- “Graph type” dropdown—changes what modeling results will be displayed in the graphic view. Options include Packets/sec, Response time (sec), and Utilization (%). While all three views are related, select the view that displays the option you are interested in.
- “Simultaneous users” spinbox—sets the number of users to simulate.
- Processing Time (ms)—the amount of time, in milliseconds, that the server or client will take to process the request.

Server Characteristics:

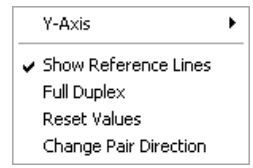
- “Server type” dropdown—options include Database, Ftp, Level, and Web servers. Each different server selection causes the expert to use a different formula suited for the selection. A level server offers a formula for a typical server.
- “Start thread time (ms)” spinbox—taken into account when the “Server type” item is defined as “Web.” The value is the amount of time it take to process a thread on the server.
- “Arrival rate (trans/sec)” spinbox—taken into account when the “Server type” item is defined as “Database.” The number of transactions per second that are being requested of the (Database) server.
- “Maximum adapter cCard throughput (Mbps)” spinbox—taken into account when the “Server type” item is defined as “Ftp.” This item defines the server’s maximum throughput. This may be the rated speed of the adapter, but most likely it is some fraction of the maximum theoretical speed (utilization) of the network. The default of this item is set in the Expert Global Settings, under the What-If tab.

  One way to get a value for this option is to run Observer on the server using the packet generation mode. Set the generation rate very high and view the utilization that the server can create using Observer’s utilization modes. The maximum utilization will reflect the NIC card’s ability to generate traffic.

- Restore Original Values button—resets all values to the initial settings for the analyzed pair.
- Set Reference button—sets the current graph lines to the reference line. For example, if you change the number of simultaneous users from 1 to 100, a What-If prediction line will be displayed and the original reference line will be displayed. If the “Set Reference” button is pressed, the new What-If prediction line will become the reference line for further What-If modeling.

What-If Analysis Right-Click Menu

The right-click menu offers a number of configuration selections in the What-If Analysis display.



- Y-Axis—selects the values to be shown on the Y-axis. This is an alternative method of selecting the “Graph Type.” Options include Packets/sec, Response time (sec), and Utilization (%). While all three views are related, select the view that displays the option you are interested in.

- Show Reference Lines—displays a “reference line” indicating the speed of the network/WAN from the initial capture data. This will only be displayed if the option to “Show Reference Lines” is enabled in the Expert Global Settings, under the What-If tab. See “Expert Global Settings – What-If Analysis Tab” on page 288.
- Full Duplex—toggles off and on the interpretation of data as full-duplex.
- Reset Values—resets all values to the initial settings for the analyzed pair. This has the same effect as selecting the Restore Original Values button.
- Change Pair Direction—changes the view of the “direction” of the pair (i.e., swaps the client and server).

Voice Over IP Expert

With the increasing importance of real-time communications—such as audio and video conferencing—over networks, the International Telecommunications Union (ITU) developed the H.323 standard, for real-time communications over networks that, like Ethernet, Token Ring, and FDDI, do not provide a guaranteed Quality of Service (QoS).

Prominent among the uses of H.323 is Voice over IP, or VoIP. VoIP uses RTP (Real-time Transport Protocol), a UDP-based protocol for the transmission of real-time data, for use in such applications as audio and video conferencing. While RTP packets contain the actual real-time data, the protocol is augmented by RTCP (Real-time Transport Control Protocol), which is used to send information *about* the data being transferred: the number of packets sent and received, the identities of the stations involved in the conversation, and so forth. By analyzing an RTCP conversation and using it to interpret the RTP data, VoIP Expert can identify and diagnose problems in a VoIP or other RTP/RTCP session.

The VoIP Expert displays H.323 conversational data in three separate graphs. Each display is designed to help identify why a connection may be experiencing problems, or at what level of network load are H.323 conversations exhibiting acceptable quality behavior.

To access the VoIP Expert, right-click on a RTCP (Real-Time Control Protocol) connection in the “UDP Events” display and select “VoIP Expert” item. The RTCP part of the conversation is the “control” aspect of the RTP (Real-Time Protocol) conversation. When selecting the RTCP conversation, you will see that its port number is always one more than its associated RTP data stream.

The first display shows the conversations lost packets and jitter in the direction of the arrow. The second display shows the other direction.

- Lost Packet % (fraction lost)—The fraction of RTP data packets from a particular source lost since the previous Sender Report (SR) or Receiver Report (RR) packet was sent.
- Jitter—An estimate of the statistical variance of the RTP data packet arrival time, measured in timestamp units and expressed as an unsigned integer.

The RTP timestamp units are based on the sampling rate for a particular payload type. In the case where there are multiple sources in a single RTCP packet, only the maximum reported Lost Packet % and Jitter values will be plotted at the given time point.

The last display shows the current conversation's bandwidth utilization, the total RTP/RTCP utilization in the capture, and the total network load during the capture.

To view total network utilization, you must have "Include Expert Load Information packets" checked in Packet Capture setup.

Decoding of VoIP Voice messages—Observer is also able to decode and either save or play VoIP voice messages.

Select UDP Events from the Expert Data button bar, and right-click on a connection that contains VoIP voice data.

> VoIP data is always contained in RTP conversations, rather than RTCP conversations. In the example, the protocol used is RTP/G723, a common format for VoIP voice traffic.

Select either Save Audio... or Play Audio from the popup dialog. Selecting Save Audio will cause the following dialog to be displayed, permitting the user to enter a name in which to save the .WAV file.

Selecting Play Audio will cause Windows to play the audio file with whichever program Windows has been configured to use for .WAV files (usually Windows Media Player).

Switched Observer

Introduction to Switched Observer

Observer provides the ability to gather statistics and capture port data for switched environments. This ability is unique in the world of protocol analysis and makes Observer the ideal tool for traffic management and troubleshooting in a switched environment.

Observer offers the following modes for switched environments; all modes display data by port (with the exception of Packet Capture):

- Discover Network Names
- Packet Capture
- Bandwidth Utilization
- Internet Observer
- Network Errors by Station
- Protocol Distribution (including IP subprotocols and IPX subprotocols)
- Size Distribution Statistics
- Top Talkers
- Utilization History
- Triggers and Alarms

Each mode offers specific switch port information. Documentation on each mode's switched display is discussed in this section.

Switched environments have been quite difficult to manage for a number of reasons, but the main problem has been the fundamental incompatibility between the architecture of most protocol analyzers and the function of a switch. A switch's purpose to ensure that traffic between systems is isolated to the specific switch ports facilitating data interchange. The purpose of a protocol analyzer is to "listen in" on conversations between systems without being directly involved in the connection. Here lies the problem: a switch's job in life is to ensure that no third party receives data that is not directly involved in the data exchange—the exact functionality that a protocol analyzer requires.

A switch isolates traffic between sending and receiving stations by instantaneously creating and removing virtual segments within the switch matrix between ports. For

example, if a system on port 3 of a switch has a packet destined for port 7, the switch will create a virtual segment between ports 3 and 7 for the time required to move the packet. The switch then removes the virtual segment. In this example, two things are ensured: for the period of time that port 3 communicates with port 7, the bandwidth between port 3 and 7 is not shared with any other stations; and any other port pair can communicate while port 3 and 7 are communicating.

Switches provide the full maximum theoretical bandwidth for port to port communication, and add to the potential maximum bandwidth of a network by allowing multiple simultaneous connections between stations. As long as there are no problems on the network, this is a valid methodology for moving traffic between station. Not only is it valid, but replacing a shared hub with a switch will almost invariably increase real throughput. As your network moves from a one-to-many communication environment to a many-to-many communications environment, your switch will continue to improve overall data throughput.

When a problem arises on the network, this methodology erects great barriers to troubleshooting. The very fact that data streams are “hidden” and paths are simultaneously created and then removed makes this environment much like trying to judge the traffic on a busy highway with your eyes closed.

Technology Overview

Observer bridges the gap between switches and protocol analyzers by using three methods for switch management:

1. Statistical sampling technologies that let you see all ports on your switch. This functionality is included in the standard Observer product.
2. RMON console functionality for switched with embedded RMON. This requires the RMON Extension for Observer.
3. SNMP console monitoring functionality for switches with embedded SNMP agents. This requires the SNMP Extension for Observer.

Additionally, since Observer can manage the ports on your switch, you can also use Packet Capture for any port (or groups of ports if your switch supports this feature) without first configuring your switch outside of the Observer environment.

A brief discussion of different switch management options will help develop an understanding of your ability to monitor your switches with Observer.

In general, switches fall into two categories:

- Switches with management options.
- Switches without management options.

Most switches from higher-end (name brand) manufacturers fall into the first category, but there is a great deal of differentiation between offerings. Some of the lower-cost switches

and switches from lower-end manufacturers do not offer any management options whatsoever.

> If your switch does not offer any management options, Observer (or any protocol analyzer for that matter) will be of little use in your switched environment.

Should your switch fall into the first category, there are typically four different types of management options available:

1. An SNMP agent to monitor different switch traffic and device-specific information.
2. An internal RMON Probe to provide partial or full RMON statistics and capture functions within the hardware of the switch.
3. The ability to mirror ports (e.g., spanning ports [Cisco's term], tap port, or management ports).
4. A Web-based management console providing various users and port-based statistics.

Observer provides analysis and management functionality for the first three options. Your Web browser provides access for the last.

Switch SNMP Agents

For switches that include an SNMP agent in the switch hardware, Observer's SNMP Management Console will allow you to query and view any or all SNMP data that the switch collects. SNMP offers a number of advantages and disadvantages over standard protocol analyzers. In general, protocol analysis and SNMP are considered a complementary solution—which is to say that their feature sets have little overlap.

Additionally, SNMP is not often considered a reliable form of problem management because it is not an independent view of the situation. A good example would be when you're having a problem with your router—do you really want to take your router's view of the situation? SNMP used for problem determination provides information from the source of the problem at the exact time when that information is most likely to be unreliable. SNMP management is better suited for management, rather than troubleshooting.

SNMP management can provide device-specific information that a protocol analyzer cannot "see" from within the device. Examples of this would be internal switch forwarding time-outs, switch management passwords, serial number, and ID information.

Internal RMON Probes

A number of switches offer some or all of the RMON1/2 statistics to use in managing and troubleshooting your switch and the associated devices on the ports.

In this environment, should the RMON implementation be sufficient for real work, Observer's RMON(2) Extension may be used to query, configure, and report any and all of the 19 RMON1/2 groups of information.

RMON and protocol analysis is not typically complementary in the way SNMP and protocol analysis can be. Rather, RMON is the “protocol analysis” side of the SNMP standard, and is an attempt to duplicate the functionality of a protocol analyzer within the standards-based world of SNMP. A full implementation of RMON2 comes close to what any high end protocol analyzer provides, if in a more cryptic format. In theory, what you lose in ease of use, you gain in multi-vendor interoperability. Sadly, most switches to date have either not implemented RMON at all, or have such a limited subset of RMON that the RMON functionality is not of much use.

Port Mirroring

For switches that support port mirroring (i.e., spanning, tapping), Observer offers two types of control and monitoring:

- Port capture, and
- Port looping.

Port capture (otherwise known as “static” monitoring) allows you to set a Probe to capture all the data and traffic from one port and redirect it to the Probe management port. For switches that support multiple port redirection, Observer allows you to specify multiple ports to capture. This mode captures all packets that are found on the port and is usually used for Packet Capture, but can also be used for any of the statistical modes of Observer.

Looping is the ability to have a Probe “loop” through all ports on the switch and collect statistics on the switch as a whole. This functionality is unprecedented in the world of protocol analyzers and provides a view of your switch as a whole—which ports are being used and to what extent; the total broadcast and cross-port jabber; the total data throughput of your switch (and thus, its ultimate efficiency) and much more.

Looping is achieved by Observer’s telnet or SNMP interface controlling your switch’s management interface and directing, in an ordered, timed, and controlled manner, the redirection of standard port data flow to the Observer Probe port.

Observer’s Probe redirects data from a specific port for a specific amount of time, then moves to the next port for the same amount of time. This continues until a loop is made of all ports on the switch (not including the Observer Probe port) and then begins again. Because Observer knows how long each port was sampled and how long it took to move to the next port, it can put all of the data together using statistical sampling calculations and provide a complete view of traffic on your entire switch.

The requirements to use Observer’s port looping and port capture functions are:

- your switch must support some sort of port redirection (often called mirroring, spanning, or tapping), and
- the switch must support a telnet or SNMP interface for controlling the mirroring, and

- you must either write a script for Observer to control the mirroring or use one of the scripts included, and
- you must enable looping or capture in the Probe setup.

More information on scripting is included at the end of this section. Probe configuration options are documented in the “Using Probes” section of this manual and briefly at the end of this section.

Web-Based Management

Many switches offer some limited management information via a browser directly connecting to the switch via a specific port (usually 80). While this information is often provided in a visually pleasing format, it is often limited and suffers from the same dependencies as SNMP (the information will be reliable only when the device is functioning correctly). As with SNMP, Web-based information is often more useful from a management perspective as opposed to a troubleshooting one.

Configuration

To enable Probe looping, you must tell Observer about your switch and either specify one of the included scripts for the Probe to use or write a script for your specific switch. Observer includes a number of scripts for specific switches. These scripts have been tested at Network Instruments on the switch models listed in the beginning comments of the script itself. Scripts should be similar within vendor’s switch implementations. Both of these items are configured in the Switch Dashboard.

Using the Switch Dashboard

The Switch Dashboard is the control console for starting, stopping, and configuring all looping and capturing of switch data by a Probe or the Observer local Probe. Additionally, this is where you tell the Probe which switch (by IP address) to connect to.

> Notches probe must be set to switched mode to be able to view the Switch Dashboard. This is done in the Local Observer Configuration dialog.

Standard (Non-Distributed) Observer

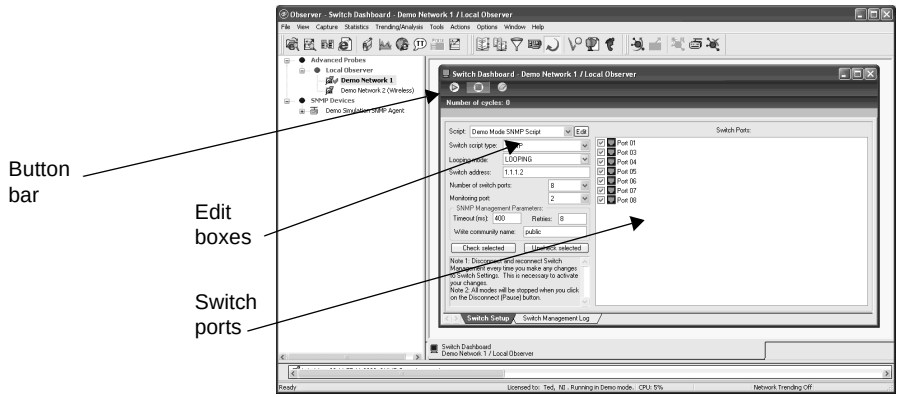
From the main menu select Options > Selected Probe or SNMP Device Properties > Switched Observer (option button).

For Distributed Observer

Select the Probe you want to put into switched mode in the list of Probes. From the main menu select Options > Selected Probe or SNMP Device Properties > Edit Probe Entry tab, and then select the SWITCHED OBSERVER option button.

Main Switch Dashboard – Switch Setup Tab

Each switch being monitored will require a setup in the Switch Dashboard Dialog. This dialog can be displayed by selecting Tools > Switch Setup Dashboard.



Important Note: Each change made in this dialog must be followed by selecting the **Stop** button and then selecting the (RE)CONNECT AND ENABLE SWITCH MANAGEMENT icon.

Switch Dashboard Button Bar

The Switch Dashboard button bar has three buttons:

	(Re)Connect and Enable Switch Management—this connects (or reconnects the Probe to the switch defined in the "Switch IP Address" setting, and begins whatever script is defined in the Probe settings dialog.
	Disconnect and pause switch management—this causes the Probe to disconnect and stops the processing of the current Probe's script.
	Clear switch log—clears the "Switch Telnet Communications Log."

Window header display:

- Number of cycles—shows the number of "loops" or cycles that the Probe has made through your switch ports. Statistically, the more cycles, the closer to 100% accuracy the displays will provide. A good rule of thumb would be that the information is + or – 20% after the first 29 cycles, + or – 10% after the next 29 cycles, + or – 5% after the next 29 cycles, etc.

Edit boxes:

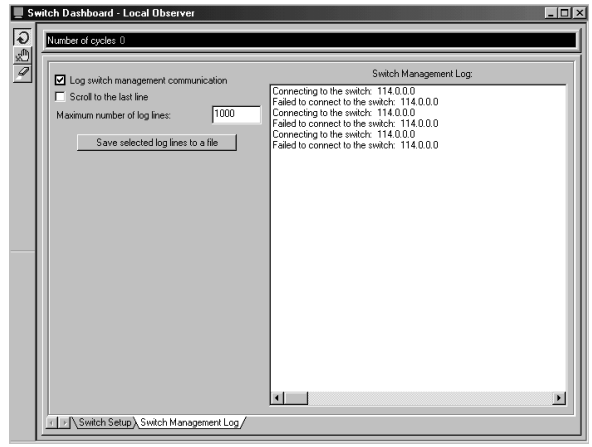
- "Script" dropdown—allows you to select the script file the current Probe will use.
- Edit button—displays the Editing Telnet Script dialog.

- “Switch script style” dropdown—allows you to select Telnet or SNMP. See “Switch Scripts” on page 312.
- “Looping mode” dropdown—allows you to select Looping or Static.
    - Looping is where the Probe samples each port checked in the “Switch Ports” display.
    - Static is where the Probe collects all data from the port or ports selected (if supported by your switch).
- “Switch address” textbox—allows you to input the IP address or DNS name of the switch to be managed by this Probe.
- “Number of switch ports” dropdown—allows you to define the number of total ports your switch contains. This number is used by Observer for all timing and configuration settings.
- “Monitoring port” dropdown—allows you to define the port where Observer or the Observer Probe is connected. Observer excludes this port from all calculations.

SNMP Management Parameters:

- “Timeout (ms)” textbox—allows you to set the timeout (in milliseconds); only enabled if you selected SNMP in the “Switch script style” dropdown.
- “Retries” textbox—allows you to set the number of retries; only enabled if you selected SNMP in the “Switch script style” dropdown.
- “Write community name” textbox—allows you to enter the community name; only enabled if you selected SNMP in the “Switch script style” dropdown.
- Check Selected button—checks the selected ports for monitoring or looping. You can select ports using the standard Windows selection controls.
- Uncheck Selected button—unchecks the selected ports for monitoring or looping. You can select ports using the standard Windows selection controls.
- “Switch Ports” checkboxes—allows you to select which switch ports will be included in the looping cycle. The number of ports displayed reflects the entry in the “Number or switch ports” edit box.

Switch Dashboard – Switch Management Log Tab


Switch Dashboard - Local Observer
Number of cycles: 0
Log switch management communication
Scroll to the last line
Maximum number of log lines:
1000
Save selected log lines to a file
Switch Management Log:
Connecting to the switch: 114.0.0.0
Failed to connect to the switch: 114.0.0.0
Connecting to the switch: 114.0.0.0
Failed to connect to the switch: 114.0.0.0
Connecting to the switch: 114.0.0.0
Failed to connect to the switch: 114.0.0.0
Switch Setup
Switch Management Log

- "Log switch management communication" checkbox—when selected, all communication with the switch will be displayed in the "Switch Management Log" window. This is primarily used for debugging.
- "Scroll to the last line" checkbox—allows you to set the focus of the switch communication log to the last line of the log.
- "Maximum number of log lines" textbox—allows you to set the length of the switch communication log.
- "Save selected log lines to a file" button—allows you to save the selected log lines to a file.
- "Switch Management Log" display—allows you to display the switch management log.

Switch Scripts

Observer supports two types of switch scripts: Telnet and SNMP.

- Telnet scripts control the Telnet interface of your switch to loop through your switch's ports.
- SNMP scripts send SNMP commands to your switch to loop through your switch's ports and are the preferred scripts for using switched Observer.

Telnet Scripts

Observer Telnet switch scripts are text files with the extension ".scr". An example switch script file name might be "HP Switch Script.scr". Scripts have sections which define specific parts of the switch initialization and control sequences. Scripts send keystrokes to

the switch in a timed fashion to manipulate the management properties of the switch. Observer emulates a VT100/ANSI emulator when sending sequences to your switch.

> **Note:** SNMP scripts are preferred.

Specifically, in the case of Observer, the Telnet script can either loop the Probe's listening capabilities from port to port, or focus the Probe's capture ability to a specific port (or group of ports if your switch supports this feature).

- All lines that begin with a "#" (pound sign or hash mark) are ignored and considered comments.
- Each section begins with a header enclosed in square brackets that describes the section's general functions.
- Script tokens tell Observer to do specific actions and to send specific keystrokes to your switch's Telnet interface.

Sections Headers

- [Initialize]—the beginning of a script and area where initial login and navigation to mirroring sections of the management interface.
- [PortXon]—enables port collection. For each port, replace the "X" with a number, "[Port1on]" for example. You should have as many PortXon sections as you have ports on your switch.

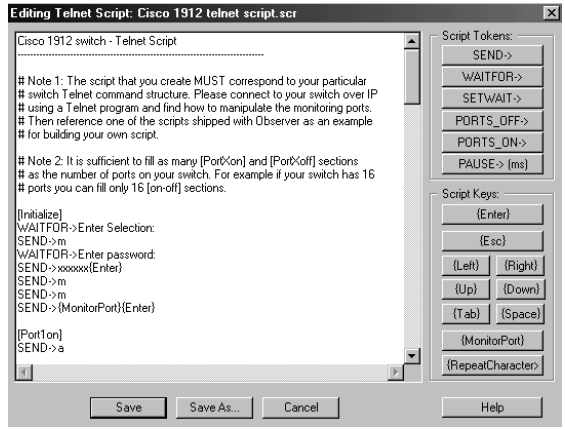
  > The maximum number of ports is 64.

- [PortXoff]—disables port collection. For each port replace the "X" with a number, "[Port1off]" for example. If your switch needs the specific port disabled prior to switching to the next port, use this as the header for these sequences (see Cisco switch script example later in this section).

Telnet Script Commands and Tokens

Most script activities will begin using Observer's built-in script editor. The script editor is accessed by selecting Tools > Edit Switch Script > Edit Telnet Switch Script File from Observer's main menu. Selecting this item will display the script editor. Note that it is not required to use the script editor to edit and maintain scripts (they are text files), but using

the editor makes the task of entering tokens easier and will contribute to the overall accuracy of the script.



Each line that is to be sent to the switch must begin with a token and end with a line feed or {Enter}. Additional commands are available to manipulate the switch.

You can enter three types of information into an Observer Telnet switch script:

- Telnet Script Commands (called Tokens)—are special commands pre-programmed into the script editor. Tokens are entered by clicking the specific token button on the right side of the script editor dialog. Note that tokens can be entered by hand—the only benefit of the script editor is to save on errors in typing the specific token text.
- Script Keys—simulate specific keys that would be sent using a terminal or terminal emulation program. Note that the sequence sent is that which would be sent from a VT100/ANSI terminal (e.g., terminal.exe that is included in Windows 2000/XP).
- Simple Keystrokes—letters, numbers, and standard characters. In general, any key which puts something you can read on the screen. These keystrokes can simply be typed into your script as you would normally type them into a word processor.

The following sections explain how to enter the different types of information into the script editor.

Entering Tokens into a Telnet Script

Tokens are entered by placing the cursor in the correct position and then clicking the specific token button on the right side of the script editor dialog.

Entering Keystrokes into a Script

Keystrokes are entered by placing the cursor in the correct position and then entering the keystrokes as you would when interfacing the Telnet management application on your switch.

Script Tokens

The available script tokens are:

- SEND-> token—follow this token by any sequence of keystrokes to be sent.
- WAITFOR-> token—this token should be followed by the string the script should wait for. The script will wait the number of seconds specified in the SETWAIT-> line. If the expected string does not arrive before the timeout is reached, the script will terminate with an error message.
- SETWAIT-> token—this token should be followed by the number of seconds the script should wait for any input to be received from the remote host (when using the "WAITFOR->" token). After the wait is complete, the script will advance to the next instruction. If no time is entered, this defaults to 10 seconds.
- PORTS_OFF-> token—this token sends all commands to turn off all ports from every [PortXoff] section. This can be useful in beginning or ending a looping section.
- PORTS_ON-> token—this token sends all commands to turn on all ports from every [PortXon] section. This can be useful in beginning or ending a looping section.
- PAUSE-> (ms) token—this token pauses the script execution for the number of milliseconds listed after the "->". For example, to pause the script for five seconds, you would enter "PAUSE->5000" (no quotes).
- WRITE_LOG-> token—writes the text after the token into the Switch Management Log. This is used for debugging purposes.

Script Keys—these buttons are used to send specific sequences to your management application that would be available using a terminal or terminal emulator.

- {Enter} button—sends an enter sequence. This should be used each time you would click the "Enter" key during your Telnet session.
- {Esc} button—sends the escape (Esc) sequence.
- {Left} button—sends the left arrow sequence.
- {Right} button—sends the right arrow sequence.
- {Up} button—sends the up arrow sequence.
- {Down} button—sends the down arrow sequence.
- {Tab} button—sends a tab space.
- {Space} button—sends a space.
- {MonitorPort} button—this token is replaced by the value that is entered in the "Monitoring port" edit box in the Script dashboard. It is possible to use math in conjunction with this token, if needed. Addition and subtraction are supported. The following result would be present in the script with a monitor port set to 4: {Monitor Port+2} would be replaced by "6"; {Monitor Port-1} would be replaced by "3."

- {RepeatCharacter} button—sends the character immediately after the “>” for the number of times immediately after the character. For example, {RepeatCharacter>?15} would send the ? character 15 times.

> Note: Any script key or token can be entered by hand using the keyboard. The buttons are provided to help script accuracy.

Script Editor buttons:

- Save button—saves the current script, using the name and location that it originally had when it was opened by the script editor.
- Save As button—saves the current script prompting you for a name and location.
- Cancel button—cancels your current editing session.
- Help button—displays the help item for the scripting dialog.

Telnet Script Example

The following is an example script for Cisco switches. Each contains comments regarding its application.

> **Note**: Initial connection to the switch is done in the Switch Dashboard. See “Using the Switch Dashboard” on page 309.

```
# begin initialization header section
[Initialize]

# wait for the switch to respond, and wait for the
# password login screen

WAITFOR->Password:

# send the 1st password

SEND->my1stpassword{Enter}

# wait for the switch to respond, and wait for the
# CiscoSwitch> prompt

WAITFOR->CiscoSwitch>

# send the “enable” command to enter configuration
# mode

SEND->enable{Enter}

# wait for the switch to respond, and wait for the
# next password prompt

WAITFOR->Password:
```

```
# send the next password

SEND->mynextpassword{Enter}

# wait for the switch to respond, and wait for the
# CiscoSwitch# prompt

WAITFOR->CiscoSwitch#

# send the “config t” command to enter
# configuration mode

SEND->config t{Enter}

# wait for the switch to respond, and wait for the
# CiscoSwitch (config) prompt

WAITFOR->CiscoSwitch(config)#

# send the config “int FA 0/2” command
# sets the configuration interface to port 2
# (where the Probe is)

SEND->int FA 0/2{Enter}

# wait for the switch to respond, and wait for the
# CiscoSwitch (config-if)# prompt

WAITFOR->CiscoSwitch(config-if)#

# Turns all port monitoring off (in case any were
# left on

PORTS_OFF->

# section for turning on port 1 (to send data to
# port 2 as defined above)

[Port1on]

# send port monitor command to turn on port 1

SEND->port monitor FA0/1{Enter}

# wait for the switch to respond, and wait for the
# CiscoSwitch (config-if)# prompt

WAITFOR->CiscoSwitch(config-if)#

# begin section to turn off port 1

[Port1off]
```

```
# turn port 1 monitoring off

SEND->no port monitor FA0/1

# wait for the switch to respond, and wait for the
# CiscoSwitch (config-if)# prompt to get ready for
# next sequence of commands

WAITFOR->CiscoSwitch(config-if)#

# The next sections are repeats of the one for
# port 1, with the actual port number changed.
# Note that Observer will automatically skip the port
# that the Probe is connected to (defined in the
# “Monitoring Port” section of the Switch Setup
# Dashboard)


# You should have a port section for each port on your
# switch—in other words, if you have 8 ports
# on your switch, you should have 8 sections with
# “[PortXon}” and “[PortXoff]” headers. If you
# have a 64-port switch, you should have 64
# sections with “[PortXon}” and “[PortXoff]”
# headers.

[Port2on]

SEND->port monitor FA0/2

WAITFOR->CiscoSwitch(config-if)#

[Port2off]

SEND->no port monitor FA0/2

WAITFOR->CiscoSwitch(config-if)#

[Port3on]

SEND->port monitor FA0/3

WAITFOR->CiscoSwitch(config-if)#

[Port3off]

SEND->no port monitor FA0/3

WAITFOR->CiscoSwitch(config-if)#

etc...
```

SNMP Scripts

Observer's SNMP switch scripts are text files with the extension ".snm". An example SNMP switch script file name might be "3COM Switch SNMP Script.snm". Scripts have sections, which define specific parts of the switch initialization and control sequences. SNMP scripts send specific SNMP "commands" directly to the switch in a timed fashion to manipulate the management properties of the switch.

> **Note:** SNMP scripts are preferred.

Specifically, in the case of Observer, the SNMP script can either loop the Probe's listening capabilities from port to port, or focus the Probe's capture ability to a specific port (or group of ports if your switch supports this feature).

- All lines that begin with a "#" (pound sign or hash mark) are ignored and considered comments.
- Each section begins with a header enclosed in square brackets that describes the section's general functions.
- Script tokens tell Observer to do specific actions and to send specific SNMP commands to your switch's SNMP interface.

Sections Headers

[Initialize]—the beginning of a script and area where any switch initialization takes place. This may be to reset the port-monitoring feature or to enable switch management.

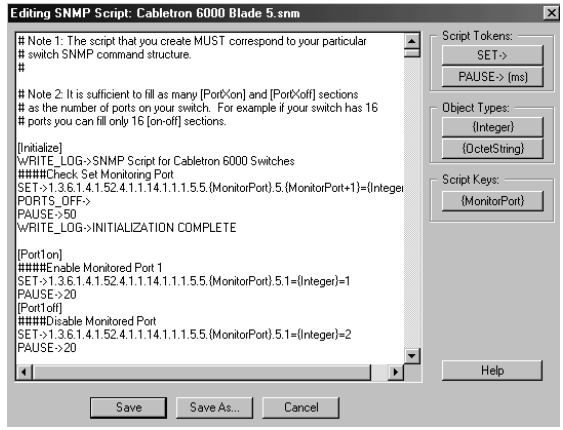
[PortXon]—enables port collection. For each port, replace the "X" with a number—"[Port1on]" for example. You should have as many PortXon sections as you have ports on your switch.

[PortXoff]—disables port collection. For each port, replace the "X" with a number—"[Port1off]" for example. If your switch needs the specific port disabled prior to switching to the next port, use this as the header for these sequences (see Cisco switch script example earlier in this section).

SNMP Script Commands and Tokens

Most script activities will begin using Observer's built in script editor. The script editor is accessed by selecting Tools > Edit Switch Scripts > Edit SNMP Switch Script File from Observer's main menu. Selecting this item will display the script editor. Note that it is not required to use the script editor to edit and maintain scripts (they are text files), but using

the editor makes the task of entering tokens easier and will contribute to the overall accuracy of the script.



Each SNMP command line that is to be sent to the switch must begin with a token. Additional commands are available to manipulate the switch.

You can enter three types of information into an Observer SNMP switch script: SNMP Script Tokens, Object Types, and Script Keys.

- SNMP Script Commands (called Tokens)—special commands pre-programmed into the script editor. Tokens are entered by clicking the specific token button on the right side of the script editor dialog. Note that tokens can be entered by hand (the only benefit of the script editor is to save on errors in typing the specific token text).
- Object Types—define the type of the value you will be using in the SNMP command. Object types can be either Integer or OctetString.
- Script Keys—are variables inserted into the script from the script dashboard.

Entering Tokens into a SNMP Script

Tokens are entered by placing the cursor in the correct position and then clicking the specific token button on the right side of the script editor dialog.

SNMP Script Tokens

The available script tokens are:

- SET-> token—sets the specific OID to the value defined at the end of the command.

The format for the SET command is:

SET->OID=Object Type=Value

Where:

“SET->” is the token

“OID” is the specific SNMP OID (Object Identifier). An example OID would be “1.3.6.1.4.1.343.6.10.1.7.0”.

“Object Type” specifies if the OID value is an Integer or OctetString. An example Object Type would be “{Integer}”

“Value” is the value that the OID should be set to. An example value would be “2”.

A sample SET command would be:

SET->1.3.6.1.4.1.343.6.10.1.7.0={Integer}=2

- PAUSE-> (ms) token—this token pauses the script execution for the number of milliseconds listed after the “->”. For example, to pause the script for five seconds, you would enter “PAUSE->5000” (no quotes).
- WRITE_LOG-> token—writes the text after the token into the Switch Management Log. This is used for debugging purposes.

SNMP Script Keys

These buttons are used to send specific values to the SNMP script.

The SNMP key is:

- {Monitor Port} button—this token is replaced by the value that is entered in the “Monitoring port” edit box in the Script dashboard. It is possible to use math in conjunction with this token if needed—addition and subtraction are supported. The following result would be present in the script with a monitor port set to 4:

{Monitor Port+2} would be replaced by “6”

(Monitor Port-1} would be replaced by “3”

> Any script key or token can be entered by hand using the keyboard. The buttons are provided to help script accuracy.

SNMP Script Editor Buttons

- Save button—saves the current script, using the name and location that it originally had when it was opened by the script editor.
- Save As button—saves the current script, prompting you for a name and location.
- Cancel button—cancels your current editing session.
- Help button—displays the help item for the scripting dialog.

SNMP Script Example

The following is an example script for a 3COM switch. Each contains comments regarding its application.

Note: Initial connection to the switch is done in the Switch Dashboard. See “Using the Switch Dashboard” on page 309.

```
# Note 1: The script that you create MUST correspond to your particular
# switch SNMP command structure.
#
# Note 2: It is sufficient to fill as many [PortXon] and [PortXoff] sections
# as the number of ports on your switch. For example if your switch has 16
# ports you can fill only 16 [on-off] sections.
#
# begin initialization header section
[Initialize]

#
# write a note into the log file to let you know it got this far

WRITE_LOG->SNMP Script for Intel 510T Switches

####Disable Port Monitoring ports

SET->1.3.6.1.4.1.343.6.10.1.7.0={Integer}=2

####Set Monitoring (Destination) Port

SET->1.3.6.1.4.1.343.6.10.2.4.1.21.1.1.{MonitorPort}={Integer}=2

PAUSE->20

WRITE_LOG->INITIALIZATION COMPLETE

[Port1on]

####Set Source Port 1

SET->1.3.6.1.4.1.343.6.10.2.4.1.21.1.1.1={Integer}=1

PAUSE->20

####Enable Monitoring

SET->1.3.6.1.4.1.343.6.10.1.7.0={Integer}=1

PAUSE->20

[Port1off]

####Disable Monitoring

SET->1.3.6.1.4.1.343.6.10.1.7.0={Integer}=2

PAUSE->20
```

[Port2on]

SET->1.3.6.1.4.1.343.6.10.2.4.1.21.1.1.2={Integer}=1

PAUSE->20

SET->1.3.6.1.4.1.343.6.10.1.7.0={Integer}=1

PAUSE->20

[Port2off]

SET->1.3.6.1.4.1.343.6.10.1.7.0={Integer}=2

PAUSE->20

[Port3on]

SET->1.3.6.1.4.1.343.6.10.2.4.1.21.1.1.3={Integer}=1

PAUSE->20

SET->1.3.6.1.4.1.343.6.10.1.7.0={Integer}=1

PAUSE->20

[Port3off]

SET->1.3.6.1.4.1.343.6.10.1.7.0={Integer}=2

PAUSE->20

[Port4on]

SET->1.3.6.1.4.1.343.6.10.2.4.1.21.1.1.4={Integer}=1

PAUSE->20

SET->1.3.6.1.4.1.343.6.10.1.7.0={Integer}=1

PAUSE->20

[Port4off]

SET->1.3.6.1.4.1.343.6.10.1.7.0={Integer}=2

PAUSE->20

etc...

Switched Modes

Discover Network Names – Switched

Discover Network Names works in the same way for both switched and non-switched mode. In switched mode, since all broadcasts are propagated over all ports on the switch, eventually Discover Network Names will find all relevant addresses. There is no additional setup for using Discover Network Names in switched mode.

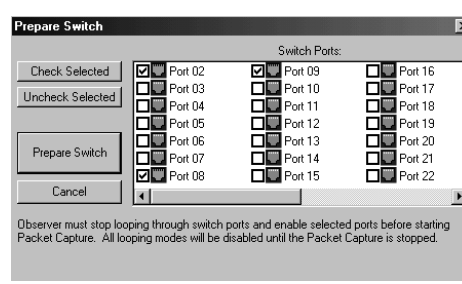
Packet Capture – Switched

When working in switched mode, Packet Capture works in a similar manner as in standard mode with the following exceptions:

- In switched mode, Observer must “prepare” the switch for packet capture. This preparation will begin as soon as you click the Start icon. If Observer is using looping to monitor statistical information on your switch, preparation includes the discontinuing of the looping process and mirroring of one or more ports (depending on what your switch supports) to the Observer port. This may take a few seconds; therefore, your capture will not start immediately.
- Prior to the capture starting, all other modes that are currently running will be ended. These running modes are dependent on the looping function and would no longer report accurate data.
- When the capture is ended, the switch is reset back into looping mode.

The preparation dialog allows you to define which port(s) you want to capture. While in Packet Capture mode, Observer is no longer “sampling” data from the ports. Observer, with the help of your switch, will capture all packets on the designated port(s).

When the START CAPTURE button is clicked, the **Prepare Switch** dialog is displayed. This dialog will not be displayed if you have selected “Static” from the Looping Mode dropdown on the Switch Dashboard Setup dialog. See “Main Switch Dashboard – Switch Setup Tab” on page 309.

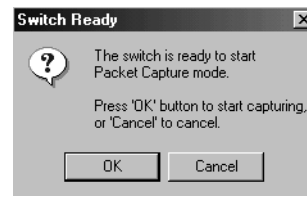


In this dialog you can configure which port or ports you would like to capture data from.

1. Click on a checkbox next to a port. You may also select one or more ports by Control-clicking and then clicking CHECK SELECTED or UNCHECK SELECTED, as desired.

Some switches support multiple mirroring of ports; others only support one port at a time. If your switch supports multiple mirroring of ports, Observer will be able to initiate a capture on all ports selected. If your switch does not, Observer will only be able to capture data on one selected port.

2. Once port selection is complete, click the PREPARE SWITCH button. Observer will prepare the switch to capture data on the port or ports that you have selected. The **Switch Ready** dialog will be displayed.


Switch Ready
The switch is ready to start Packet Capture mode.
Press 'OK' button to start capturing, or 'Cancel' to cancel.
OK
Cancel

3. To begin capturing packets on the port or ports, click OK.

Bandwidth Utilization – Switched

Bandwidth Utilization in a switched environment is a metric that is completely different than what you may be used to in a non-switched environment. The bandwidth of any switch depends on the mixture of port speeds, how many ports are in use, and how efficient the many-to-many relationship is constructed.

For example, the maximum theoretical bandwidth of a switch with eight 10/megabits ports would be 40/megabits. The maximum theoretical bandwidth of a switch with eight 10/megabits ports and two 100/megabits would depend on which ports are talking to which other ports. In the best of all cases (that is the two 100/megabits ports are talking to each other) the maximum theoretical bandwidth (or throughput) of the switch would be 140/megabits. But if for some percentage of the time the systems on the 100/Mbits ports are speaking to 10/megabits devices, the maximum throughput would change depending on what is happening at any moment of time.

The idea of bandwidth utilization in a switched environment becomes one of throughput and how close to a maximum theoretical throughput the switch can achieve. This throughput is a good judge of how efficiently your switch is utilizing its resources, but the actual number itself ranges quite a bit depending on which ports are talking to which other ports.

For this reason, Observer shows switched Bandwidth Utilization as a number of graphs (dials or port listing). In graph mode the top graph shows the total switch load in bits/second. All other displays show each port's speed in bits/sec. The graph and dials

automatically scale from modem speeds of 1000 bits/second to gigabit speeds of 1000 megabits/sec.

Y-axis values automatically to the current (within the viewable time frame) port or aggregate switch load. Typical network speeds are represented by the following values:

Modem/ISDN/TI/T3	10K—45M
10megabit Ethernet Range	2M—8M
100megabit Ethernet Range	20M—80M
1000megabit (GigaBit) Range	200M—800M
4MB Token Ring	1M—3M
16MB Token Ring	4M—14M

This metric is a good value to determine how efficiently you are utilizing your switch.

See “Bandwidth Utilization” on page 69.

Internet Observer – Switched

In switched mode, Internet Observer functions identically to the non-switched Internet Observer.

See “Internet Observer Mode (Internet Patrol, Pairs Matrix, IP Subprotocols)” on page 76.

Network Errors by Station – Switched

The Switched Network Errors by Station mode will identify and display Ethernet error packets broken down by switch port source of the error and the type of error packet. To identify the specific station on a port that has multiple addresses, a separate Observer or Probe would need to be installed on that downstream segment.

The ability to track Ethernet errors by station requires the use of both a Network Instruments ErrorTrak™ driver, a certified network adapter card, and a switch that will forward error packets when the port is being monitored.

Once the switched Errors by Station is running, the display is identical to the standard (non-switched) Errors by Station display except all data is by port.

See “Network Errors by Station Mode” on page 93.

Size Distribution Statistics – Switched

Switched Size Distribution Statistics displays all standard (non-switched) size distribution statistics by port. Each port may display a particular MAC address (and IP address) if the

port is attached to only one system, or may display “multiple addresses” if the port is attached to multiple system via a downstream hub.

Top Talkers – Switched

To view Top Talkers statistics in switched mode, you must first set your Probe (local or remote) to switched mode and then complete the switched setup for your particular switch. See “Configuration” on page 309.

Switched Top Talkers mode displays all standard (non-switched) Top Talkers statistics by port. Each port may display a particular MAC address (and IP address) if the port is attached to only one system, or may display “multiple addresses” if the port is attached to multiple systems via a downstream hub.

The MAC display of Top Talkers shows all other statistics identically as in the standard (non-switched) MAC Top Talkers display, only they are by port as opposed to by address.

The IP display of Top Talkers shows all statistics identically as in the standard (non-switched) IP Top Talkers display, only they are the IP addresses that are found within your switch.

See “Packet Size Distribution Statistics Mode” on page 122.

Utilization History Mode – Switched

In switched mode, Utilization History displays the same information that the non-switched mode displays, only the display is both by port. The ports displayed will reflect the ports that have been checked in the Switch Dashboard. The top display is the aggregate switch throughput.

As with switched Bandwidth Utilization, the top graph (the first dial in dial mode or “switch” line in detail mode) shows the aggregate Utilization History information for the entire switch (all ports that are checked in the Switch Dashboard). All other graphs (dials or lines) are for the specific ports of the switch being monitored.

See “Utilization History Mode” on page 132.

Triggers and Alarms – Switched

In switched mode, Triggers and Alarms function identically to the non-switched Triggers and Alarms, with the exception that only the triggers will function on switch port data.

See “Triggers and Alarms Mode” on page 148.

Observer Suite: SNMP Management Console

SNMP Management Console is a part of Network Instruments' Observer Suite, bringing the cross-platform SNMP (Simple Network Management Protocol) standard to the Observer console.

> SNMP is not "simple" as its name implies. On the contrary, it is a difficult concept to understand. A brief overview and description of SNMP follows; however, it is by no means a comprehensive discussion. This overview is intended to give you a very simple introduction to SNMP. You don't have to be a software engineer to understand SNMP, but you will find that using Observers' SNMP Management Console is easier to use with a basic understanding of how SNMP works.

SNMP Overview

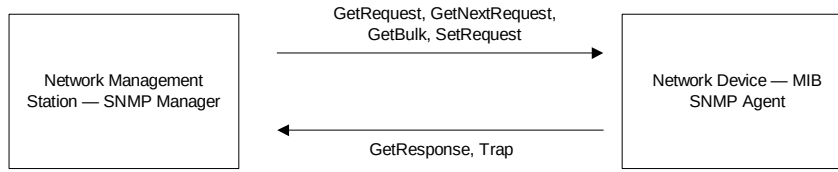
Simple Network Management Protocol (SNMP) is an application-layer protocol designed to facilitate the exchange of management information between network devices. The SNMP system consists of three parts: SNMP Manager, SNMP Agent, and MIB.

- SNMP Manager—uses information in the MIB to perform operations on each object.
- SNMP Agent—gathers data from the MIB, which is the repository for information about device parameters and network data. The agent also can send traps, or notifications of certain events, to the manager.
- Management Information Base (MIB)—stores the information about each managed object.

From the perspective of a network manager, network management takes place between two major types of systems: those in control, called managing systems, and those observed and controlled, called managed systems. The most common managing system is called a Network Management System (NMS). Managed systems can include hosts, servers, or network components such as routers or intelligent repeaters.

The exchange of information between managed network devices and a robust NMS is essential for reliable performance of a managed network. Because some devices have a limited ability to run management software, most of the computer processing burden is assumed by the NMS. The NMS runs the network management applications that present management information to network managers and other users.

Instead of defining a large set of commands, SNMP places all operations in a GetRequest, GetNextRequest, GetBulkRequest, and SetRequest format. For example, an SNMP manager can get a value from an SNMP agent or store a value in that SNMP agent. The SNMP manager can be part of a NMS, and the SNMP agent can reside on a networking device such as a router. If SNMP is configured on a router, the SNMP agent can respond to MIB-related queries being sent by the NMS.



- GetRequest—supplies a list of objects and values they are to be set to (SetRequest). The agent returns GetResponse.
- GetNextRequest—retrieves the next instance of information for a particular variable or device.
- GetResponse—informs the management station of the results of the GetRequest or SetRequest by returning an error indication and a list of variable/value bindings.
- GetBulkRequest—similar to GetNextRequest, but fills the GetResponse with up to a maximum repetition number of GetNext interactions.
- SetRequest—alters the value of objects which can be written to the MIB.
- Trap—an unsolicited message sent by an SNMP agent to an SNMP manager indicating that some event has occurred.

With this operation, an SNMP manager does not need to know the exact variable name. A sequential search is performed to find the needed variable from within the MIB.

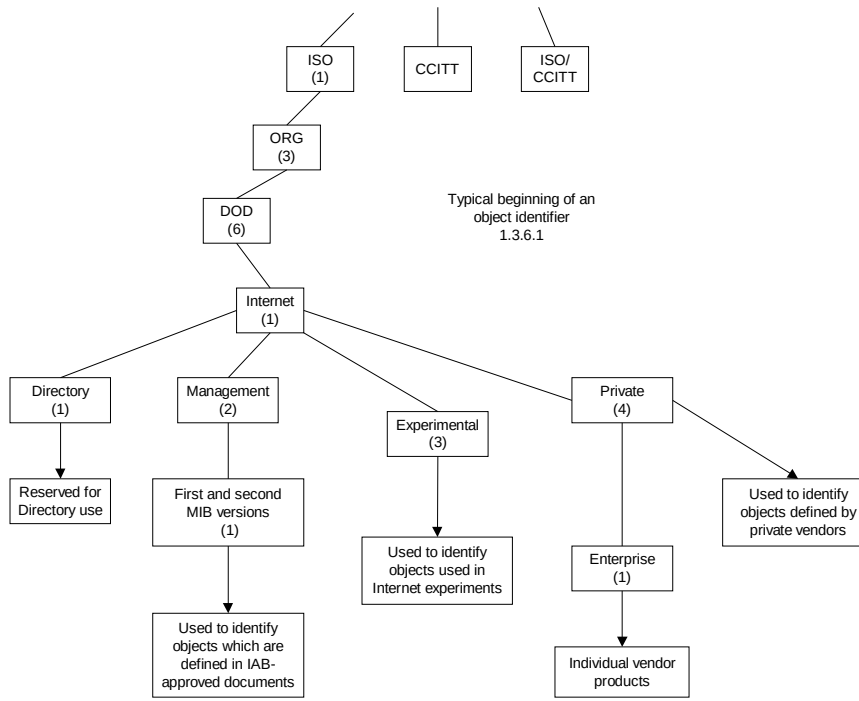
In a managed device, specialized low-impact software modules, called agents, access information about the device and make it available to the NMS. Managed devices maintain values for a number of variables and report those, as required, to the NMS. For example, an agent might report such data as the number of bytes and packets in and out of the device, or the number of broadcast messages sent and received. In the Internet Network Management Framework, each of these variables is referred to as a managed object. A managed object is anything that can be managed, anything that an agent can access and report back to the NMS. All managed objects are contained in the Management Information Base (MIB), a database of the managed objects.

An NMS can control a managed device by sending a message to an agent of that managed device requiring the device to change the value of one or more of its variables. The managed devices can respond to commands such as set or get commands. The set commands are used by the NMS to control the device. The get commands are used by the NMS to monitor the device.

MIBs

A Management Information Base (MIB) is a formal description of a set of network objects that can be managed using the Simple Network Management Protocol (SNMP).

The unit of data collected is called the SNMP object. For each device, a set of SNMP objects and rules for addressing the objects are defined in a MIB file. MIBs are key to the logical, orderly functioning of SNMP. MIB objects (OIDs) are represented by a tree hierarchy; each object has a unique address based on its position in the tree. The address count begins from the “root” of the object tree; one number is added to the address with each new branch. The root of the tree is unnamed and splits into three main branches: Consultative Committee for International Telegraph and Telephone (CCITT), International Organization for Standardization (ISO), and joint ISO/CCITT.



These branches and those that fall below each category have short text strings and integers to identify them. Text strings describe object names, while integers allow computer software to create compact, encoded representations of the names.

The object identifier in the Internet MIB hierarchy is the sequence of numeric labels on the nodes along a path from the root to the object. The Internet standard MIB is represented by the object identifier 1.3.6.1.2.1. It also can be expressed as iso.org.dod.internet.mgmt.mib. The format of the MIB is defined as part of the SNMP.

(All other MIBs are extensions of this basic management information base.) MIB-I refers to the initial MIB definition; MIB-II refers to the current definition. SNMPv2 includes MIB-II and adds some new objects.

Each MIB has a name, a syntax, and an encoding.

- Name—identifies the object

Example:
SYSDESCR = the object descriptor 1.3.6.1.2.1.1.1 = the object identifier

- Syntax—defines the object's structure (e.g., octet string, integer).
- Encoding—an object's representation using the object's syntax (e.g., "the local IP address for this TCP connection," "Read Only," or "Mandatory").

Example:
Object: TCPConnLocalAddress Syntax: Integer Definition: The local IP address for this TCP connection Access: Read only Status: Mandatory

When requested, the SNMP agent transfers an SNMP message across the network in a standard format, as specified by the set of SNMP Request for Comments (RFCs). Related MIB objects often are combined into MIB groups. MIB groups make it easier to manage a large number of MIB objects. Some MIBs, such as the standard MIB-2, contain many MIB groups. Proprietary MIBs usually have only one, or a few, groups.

OIDs

An Object Identifier (OID) is a unique identifier assigned to a specific object. The identifier consists of a sequence of numbers that identify the source of the object, as well as the object itself. This sequence of numbers is variable in length, so in addition to the sequence of numbers, there is a length field. OIDs are organized in a tree structure; the sequence of numbers identifies the various branches of the subtree that a given object comes from.

The root of the tree is the ISO (International Standards Organization) trunk. Its value is one (1). Each branch below the root further identifies the source of the given object. All SNMP objects are members of the subtree identified by iso.org.dod.internet or 1.3.6.1.

Each additional component further defines the exact location of an object. The numbers for each subtree are assigned by the IETF to ensure that all branches are unique. While it is good to know that OID identification structure exists, in general, OID management is

done by SNMP Management Console and no specific OID knowledge is required to use SNMP Management Console.

SNMP Management Station

The SNMP Management Station is a program designed to poll SNMP agents, collect information, and display the collected information in an easy-to-view format. Because each SNMP agent on a network can support a unique MIB, the SNMP management station must load MIB information for all the agents it intends to access. Without this information, the management station cannot make sense of proprietary MIBs and cannot obtain information from their agents.

The management station polling process typically includes the following steps:

- The management station composes an SNMP request that includes one or more MIB objects.
- The management station sends the request packet to an agent, located on a network device.
- The agent receives the request, checks the values of the objects requested, composes a reply packet, and sends it back to the management station.
- In the case of SNMP Management Console, the data is displayed in chart, form, list, or table format.

Through the management station, SNMP agents can provide information to a network administrator without the administrator physically attending to the device.

Almost any network device can be equipped with an SNMP agent. However, because the addition of an SNMP agent typically will increase the cost of the device, many devices are available without the SNMP agent installed. Typical examples of SNMP-aware devices are: network bridges, routers, network cards, Ethernet and Token Ring hubs/switches, network printers, UNIX hosts, NetWare servers, and Windows 2000/XP servers and stations.

Introduction to SNMP Management Console

During the last decade, reliance on local and wide area networks has increased steadily. As networks grow larger in size and more complex, so does the importance of effective network management.

While many methods exist for monitoring network activity, one of the most important emerging standards is SNMP. Unlike protocols designed to monitor network traffic, SNMP is a standard for monitoring specific network devices, providing an efficient and highly flexible way to collect and organize the information needed to optimize network performance.

Network Instruments designed SNMP Management Console as a highly functional, easy-to-use feature of FrameMaker Suite to help you take advantage of SNMP's capabilities. SNMP Management Console includes an SNMP management plug-in for Observer, a MIB compiler, and a graphical forms editor/viewer—a complete RFC-compliant implementation of SNMP for the Microsoft Windows 2000/XP platforms.

Whether you're a network administrator, network user, programmer, network application developer, or network product tester, SNMP Management Console delivers features that will help you get the most from SNMP and your network.

SNMP Management Console offers:

- Greater network control—in addition to helping you collect network management information, SNMP Management Console can set or configure writable objects. You may, for example, switch modes on a network printer or reconfigure a 100BaseT Ethernet hub or switch.
- Extended Management Information Base (MIB) support—since SNMP Management Console supports any MIB-2 (RFC1213) agents installed on most Windows 2000/XP, Windows NT, UNIX, Linux, and NetWare systems and devices, SNMP Management Console lets you install MIB definitions for SNMP agents from different vendors. If your network includes SNMP devices from different vendors, separate MIB definitions can be installed and used simultaneously by SNMP Management Console.
- Ease of use—SNMP Management Console's modular design makes it both powerful and easy to use. Different SNMP functions are divided among the main windows, and multiple agent data can be viewed simultaneously.

Who Should Use SNMP Management Console?

Any network administrator, systems consultant, or network programmer will find SNMP Management Console useful. SNMP Management Console and its related utilities are designed to meet the needs of network professionals, ranging from beginner to expert.

SNMP Management Console is most useful for network administrators who want to monitor their LANs and manage SNMP-aware devices from a single location. SNMP Management Console helps administrators make decisions based on hard facts instead of guesswork.

In many cases, SNMP provides more information or different information that is not accessible using other network analysis tools, helping the administrator pinpoint problems and determine solutions that might be overlooked otherwise.

SNMP Management Console Main Components

The SNMP Management Console software package includes the following components:

- The MIB Compiler compiles SNMP MIBs into the binary format used by SNMP Management Console and offers a drag-and-drop interface for creating custom requests from MIB objects.
- Global Event Log displays general SNMP events and traps.
- Agent windows display all lists, charts, forms, tables and the local event log.
- SNMP agents and SNMP agent request lists show all agents, and when an agent is selected, the set of requests that have been configured for the agent.

SNMP Management Console is integrated into the Observer interface. All SNMP functionality is available concurrent with Observer's functionality.

Getting Started

SNMP Management Console and its utilities are powerful, yet can be learned with only a few hours' study. The programs are designed primarily for network administrators, but this manual includes information that may be of interest to anyone who wants to learn more about their network from an SNMP perspective.

Preparing to Use SNMP Management Console

Install Additional MIBs

SNMP Management Console includes a number of preinstalled MIBs. These MIBs are for various common devices (e.g., servers) and include the standard MIB RFC1213.

> The standard MIB (RFC1213) should work on any SNMP-enabled device. You may find that the standard MIB or the provided MIBs provide enough information so that no additional proprietary MIB installation is required.

Should you want to install a vendor-specific MIB, select File > Compile MIB File option and specify your MIB file.

> This option is only available from the File menu when the MIB Editor is visible. To make the MIB Editor visible, select View > MIB Editor.

SNMP Management Console will import and compile your MIB. The MIB will now be available for selecting requests in the MIB viewer.

Enable SNMP Network Agents

Although many devices are advertised as SNMP-compatible, you may need to install or enable manufacturer-provided SNMP agents on your specific device. For example, you may need to configure and run SNMP services on your UNIX or Windows system. You will also need to check whether there is (or has been) a community name specified on the agent and what the community name is on the specific system.

> Typically, the default community name is "**public**."

Check the device or server manuals for more information on installing or enabling SNMP agents.

Configuring SNMP Management Console

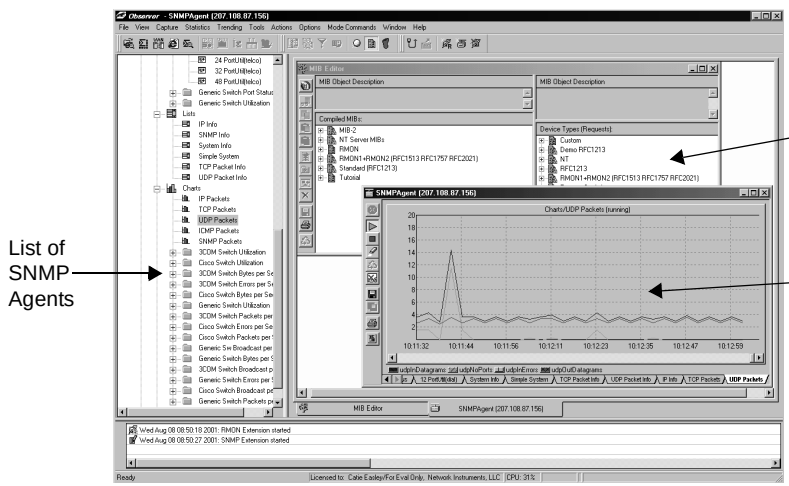
After installation, SNMP Management Console will generally require little, if any, configuration before it can be used.

General SNMP Management Console options are defined in Options > Observer General Options > SNMP Tab. See “Observer General Options – SNMP Tab” on page 246.

Using SNMP Management Console

SNMP Management Console Interface Overview

The SNMP Management Console is integrated into the Observer interface. Make certain that you have the SNMP Management Console Agent List visible by selecting View > Advanced, RMON and SNMP Probe Lists from Observer’s main menu.



When Observer is licensed to include SNMP Management Console, the Console is running at all times. To view the Console windows, just click on one of the SNMP agents in the List of SNMP Agents.

When an agent is selected, Observer’s interface turns into the SNMP Management Console interface. You will notice that the menus, button bars, and main display areas change. You can return to the Observer interface by selecting a Probe from the List of Probes.

The SNMP Management Console interface is divided into three main sections:

- List of SNMP Agents pane—displays each agent as an icon. Agents are queried by request files that define five types of requests: charts, forms, lists, tables, and traps. When an agent is selected, the requests are displayed in the SNMP Agent Requests pane.
- SNMP Agent Request pane—SNMP Agent Requests are shown in this pane. Selecting a chart, form, list, table, or trap will display the associated request output in the Agent Display pane.
- Agent Display pane—all data is displayed in one window per agent. Each item (charts, forms, lists, tables, and traps) is selected by the associated tab at the bottom of the Agent window.

Additionally, SNMP agents can be displayed in map format alongside of Observer Probes. The map format lets you display graphically (either geographically or topologically) your network layout, including the positions of SNMP agents and the connections between them and Observer Probes. You can scan in or draw a map or diagram and place your servers, hosts, and other SNMP agents in their appropriate locations. SNMP Management Console includes a set of bitmaps for different devices, or you may add your own bitmaps for map objects (in Windows BMP format).

SNMP Management Console lets you add, edit, or delete agent entries. When you add a new agent entry, you must associate a request file with it. Assigning a MIB also makes available a set of pre-configured menu requests used to poll the agent for data. A request file defines a set of objects for monitoring from one or more MIB groups. You can remove request items or create and add new request items using the MIB Editor. See “The MIB Editor” on page 352.

Functional Overview

SNMP Management Console polls SNMP agents and displays the collected information in a chart, form, list, or table. To accomplish this, the SNMP Management Console creates request packets in SNMP format and sends these packets to agents using the UDP protocol as the carrier. The SNMP packet, often called a PDU (Protocol Data Unit) consists of one or more SNMP objects.

When SNMP Management Console sends an SNMP packet to an SNMP agent, it either asks for information about an object (a Get request), or asks to set the value of an object (a Set request). When the agent receives the SNMP packet, it checks whether the object exists in the agent's MIB, finds object values, creates a reply packet, and returns the reply packet to the SNMP Management Console.

Because SNMP uses UDP (User Datagram Protocol) to transfer requests and replies, and because the UDP protocol does not require the receiving station to acknowledge receipt of a packet, there is a chance that either the request or reply packet will be lost.

To address this potential problem, SNMP Management Console uses a timeout-retry mechanism. You can specify the amount of time SNMP Management Console will wait

before deciding that the request was lost and the number of times SNMP Management Console will resend the packet. When the maximum number of retries is reached and no reply has been received, SNMP Management Console considers the SNMP agent not present, out of order, or turned off, and displays a timed out message in the agent log.

Configuring SNMP Agents

For the SNMP Management Console to work with SNMP agents on the network, both must be configured.

> Here, the term “SNMP Agent” is used to mean the actual agent on the network device, rather than the representation of that device in Observer’s SNMP Extension.

The SNMP agents on the network must recognize SNMP Management Console as a management station that is permitted to access their MIB information. To poll the agents for information, the SNMP Management Console must know the IP addresses and community names of each agent.

A device’s “community name” is, in effect, its password. Some devices have two community names (or two passwords) one of which is a read-only password (usually called the community name, the public community name, or the read community name), and a read-write password (usually called the private community name, the write community name, read/write community name, or sometimes, the community name). In many environments, the default read community name is “public” and the default write community name is “private.”

If there is a public and a private community name, SNMP Management Console can use either, although it cannot write to an SNMP device without the read-write community name.

The necessity of configuring the SNMP agent on the network will depend on the device. Most devices, when properly queried using the appropriate community name, will respond.

> If you wish to restrict access to the SNMP device, replace “public” with a new community name. The new community name becomes your password to the agent.
>
> The usual reason to change community names is for security. Security can be enhanced by picking a random string of alphanumeric characters as a community name, rather than using the default community name of “public,” which provides little, if any, security at all.

Some agents will require further configuration, sometimes involving entering the SNMP Management Console's IP address in the agent's database as a management console.

> In such cases, the default IP address is 0.0.0.0. The “0” IP address means that any SNMP management station can access the agent. If you decide that

only SNMP Extension is to have access to this sort of SNMP agent, set the IP address to the SNMP Extension's console address.

The procedure may be different for each agent. Refer to the device's documentation for more information on configuring and enabling SNMP.

To have the SNMP agent send trap messages to SNMP Management Console, you must add the SNMP Management Console's IP address to the list of management stations that can receive trap messages from the agent. This is a different issue from that of some agents requiring an IP address for SNMP requests. Traps are sent in response to an event on the device, and not in response to a request from SNMP Management Console; without being told where to send the traps, the SNMP agent simply would not know where to send them.

See the specific device's manual for instructions on how to configure the SNMP device.

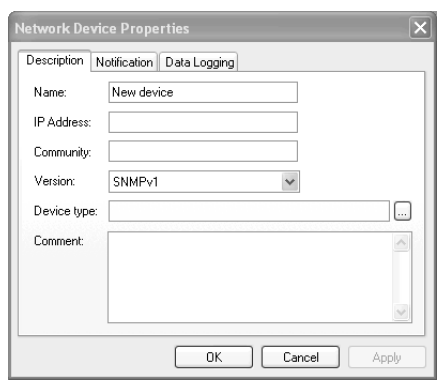
Adding, Modifying, and Deleting SNMP Agents

To collect information from your SNMP-enabled network devices, you must add an agent entry for each SNMP agent on your network.

Adding an SNMP Agent

To add a new agent entry, select Actions > Add SNMP Device or right-click in the SNMP Agents pane and select the ADD_SNMP AGENT item. Either action will open the **Network Device Properties** dialog.

Network Device Properties – Description Tab



- "Name" textbox—the name that is displayed to the right of the agent icon in the SNMP Agents list. Enter any descriptive name.
- "IP Address" textbox—the IP address of the SNMP agent you want to add.
- "Community" textbox—the community name. This is typically "public." By convention, SNMP uses the community name and management station IP address the same way login name and password are used in a telnet (terminal) session.

Some SNMP agents will respond to a menu request only if the management station IP address exists in the agent's list and if the request contains the proper password.

In SNMP, the password is called the community name. To remain accessible to any SNMP station, most SNMP agents use the default community name “public”.

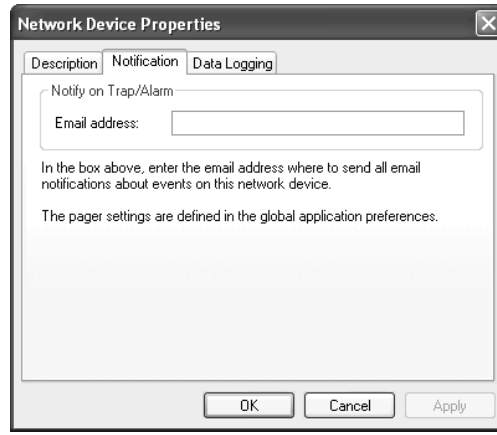
> If you do not specify the correct community name (or, in the case of those agents who maintain an IP address table, if your SNMP Management Console IP address is unknown to the SNMP agent), the agent will not respond to your requests. SNMP Management Console will re-send the request until it times out.
>
> If you are polling the SNMP agent for the first time, a failure to respond may be caused by any one, or more, of the following:
>
> The SNMP agent is up and running, but SNMP Management Console is not entered as a management station in the agent's database.
>
> The community name is wrong.
>
> SNMP services are not enabled on the device.
>
> The SNMP agent's device is down.
>
> If you have previously successfully polled the SNMP agent, only the last one is possible, unless the configuration of the SNMP agent’s device has changed.

- “Version” dropdown—SNMP Management Console supports both SNMPv1 and SNMPv2, a superset of SNMP1.

  > Most SNMP devices do not support SNMPv2. If in doubt, leave this setting at the default, SNMPv1.

- “Device type” textbox—a request file based on the RFC1213 standard MIB request file is included with SNMP Extension.
- Browse button—allows you to browse available files.
- “Comment” textbox—allows you to fill in any comment you want here.

Network Device Properties – Notification Tab

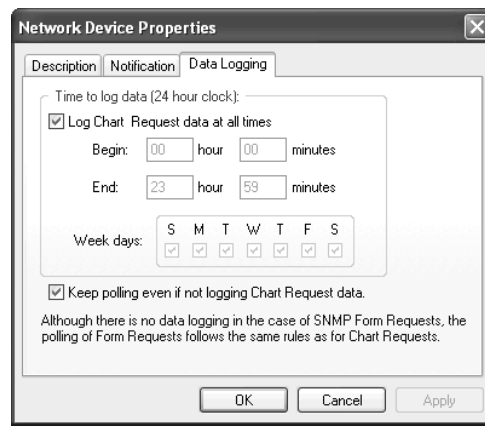

Network Device Properties
Description
Notification
Data Logging
Notify on Trap/Alarm
Email address:
In the box above, enter the email address where to send all email notifications about events on this network device.
The pager settings are defined in the global application preferences.
OK
Cancel
Apply

Notify on Trap/Alarm:

- "Email address" textbox—allows you to enter the email address to send notifications to (from traps or alarms for this agent).

  This is a different issue from the IP address (of the computer running Observer with SNMP Extension) to which the SNMP agent itself is to send traps. In this case, you are specifying the email address of the person who is to be notified when a trap message is received by SNMP Extension.

Network Device Properties – Data Logging Tab



Time to log data (24 Hour Clock): You can choose to have device data logged all the time, or schedule times to collect and log data on particular days of the week within particular hours.

Keep polling even if not logging Chart Request data.

Edit an SNMP Agent

To edit an agent, right-click on an existing agent entry and select the PROPERTIES menu item.

Delete an SNMP Agent

To delete an agent, right-click on an existing agent entry and select the DELETE NETWORK DEVICE menu item.

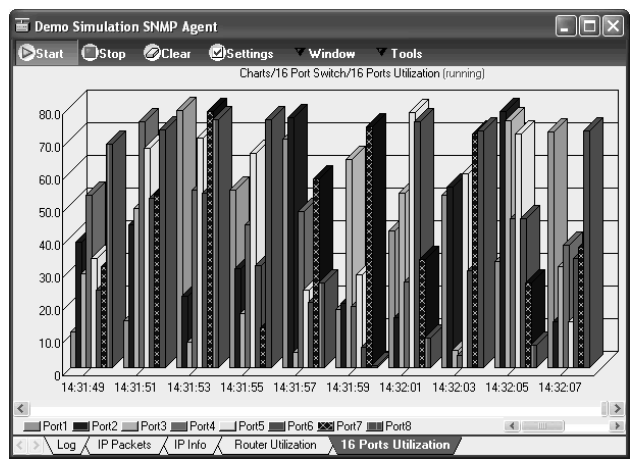
SNMP Buttons

SNMP buttons (some of them are grayed out unless an SNMP device is selected from the Observer Device list) buttons provides shortcuts for opening the MIB Editor and walking a MIB:

	Walk Agent MIB—causes SNMP Extension to “walk” through the agent MIB, generating a file that can be used to help you set up and reconfigure a MIB file.
	Show MIB Editor—toggles the display of the MIB Editor.

Using Agent Information Windows

The information collected from agents by SNMP Extension is displayed, upon request, in an Agent Information Window. When you select an agent entry from the SNMP Agents list, or from the map display, an Agent Display pane opens.



An agent display is an “MDI child” window. It cannot be moved outside the display area. You can open multiple agent windows simultaneously and tile them in horizontal, vertical,

or cascading formats. One window per agent is opened. Select a tiling choice from the Windows menu or click the appropriate tiling choice on the button bar.

> The total number of agent windows you can open simultaneously is limited only by your available Windows resources.

Each agent window can display any combination of lists, charts, tables, or forms. Each new list, chart, table, or form creates a new tab at the bottom of the agent window.

When multiple agent windows are open, you can select an active window by selecting it from the Windows menu. The Windows menu also includes commands for arranging icons and closing all open windows.

Agent windows can be minimized (its icon will appear at the bottom of the Agent Display Area) or maximized to completely fill the Agent Display Area. When the agent window is maximized, it will change in size as the Agent Display Area is resized.

Each Agent Information Window consists of a title bar containing the name of the monitored SNMP agent, a button bar, and a window where information (chart, list, table, or error log) is displayed. The button bar includes the following buttons:

	Start SNMP chart button—starts the chart (this button is only available for charts).
	Stop SNMP chart button—stops the chart (this button is only available for charts).
	Clear SNMP chart button—clears the chart's data (this button is only available for charts).
	Refresh the current request view—refreshes the current list or table.
	Close current tab—closes the current request view (not the whole request window).
	Start chart trending—saves the current chart's data in trending format.
	Write unsaved chart data to log file—when logging has been enabled for a chart, SNMP Extension will write any unsaved data to the log file.
	Print current agent display—prints the current display.
	SNMP chart properties—opens the Properties dialog allowing you to set and modify chart properties for the present session.

Each agent information window contains an Event Log tab that displays the local event log. This window cannot be closed. Errors appear only if the agent is down or

malfunctioning. When an agent is down, the Event Log displays a message indicating that SNMP Management Console exceeded the number of retries while attempting to poll the agent. Another type of error is reply packet parsing errors. If these errors appear, either the SNMP agent is malfunctioning or it's sending reply objects not supported by SNMP Extension.

Collecting SNMP Agent Information

After opening an Agent Information window, you may collect information from SNMP agents for display in charts, lists, forms, or tables. Charts are used for time-dependent information. Lists and tables are used for both time-dependent and time-independent information. Forms display SNMP data in a graphical format. Each collection mode is discussed below.

Collecting Chart Information

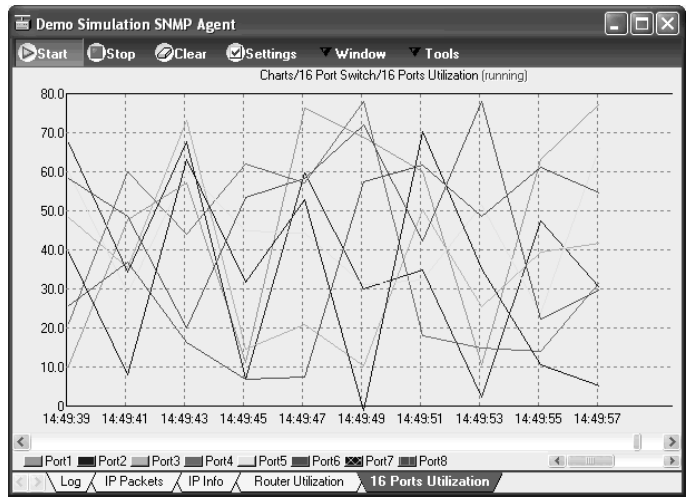
Chart displays are limited to numerical time-dependent information; therefore, MIB objects such as IP addresses, octet strings, hardware addresses, bitfields, enumerated integers, and different constant integers are not candidates for chart requests. In general, three types of variables do not fit well in charts:

- Non-numerical variables that cannot be displayed in any reasonable way in the chart format (e.g., names).
- Constants: change of a value in time (the differential of the value) will always be equal to zero.
- Table objects are not displayed in charts.

Chart requests are created and modified using the MIB Editor. See “Using the MIB Editor” on page 354.

To receive chart information from an agent, select the Charts tree item in the SNMP Agent Requests area. Then double-click on the chart you would like to view. This will display

the chart in the current agent information window if one is open, or will open a new agent information window if one is not currently running.



When you select a chart request, SNMP Extension begins polling the agent. You can define the length of the request period and define chart display parameters by right-clicking on the chart and selecting Chart Properties. See “Building and Modifying Charts” on page 359.

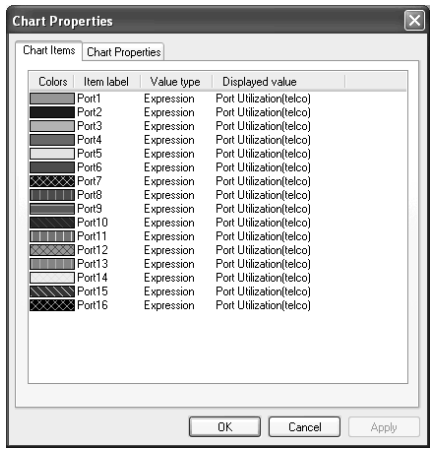
Chart information can be saved from the agent window. You can save the chart data in a file then import it into a spreadsheet program (e.g., Microsoft Excel or Lotus 1-2-3).

Customizing Charts

When agent information is displayed in chart format, several options are available for customizing the display. To define the following settings, right-click on the chart and select CHART PROPERTIES.

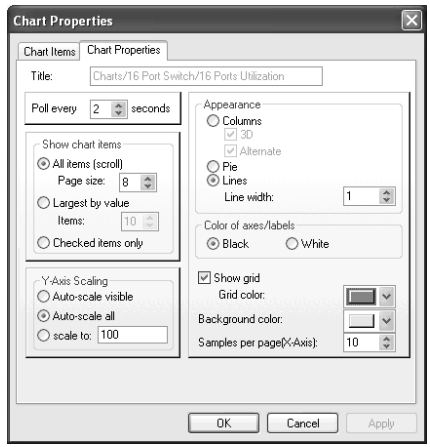
> **Note:** When changes are made to a chart from the Chart Properties display window, the changes are effective for the present session only. Persistent changes must be made to the chart from the MIB Editor. See “Using the MIB Editor” on page 354.

Chart Properties – Chart Items Tab



- Show items—displays your choice of monitored items in a chart.

Chart Properties – Chart Properties Tab



- "Title" textbox—displays the current chart's title.

  Note: The title can be changed only from the MIB Editor. If you attempt to make a change to a chart from either the Chart window or the SNMP Agent Request pane, the following warning box will be displayed:

  If you do not wish to receive further warnings that changes outside of the MIB Editor are not persistent, check the "Do not show this dialog in the future" checkbox. To enable warnings, click Options > Observer General Options > SNMP and check the box entitled "Check this box to enable all optional hint messages."

- “Polling frequency (sec)” spinbox—allows you to set how frequently SNMP Management Console will poll an agent for data to update the chart.

Show chart items:

- all items (scroll) option button—allows you to display all items contained in the chart.
- “Page size” spinbox—allows you to specify the number of items displayed on each page of the chart.
- checked items only option button—allows you to select the items kept on the Chart Items tab to be displayed.

Appearance:

- Columns option button—allows you to change the display of the chart.
  - “3D” checkbox—allows the display of the chart in **three-dimensional sequential columnar format.**
  - “Alternate” checkbox—allows the display of the chart in **alternating bar columnar format.**
- Pie option button—displays the chart in two-dimensional pie format.
- Lines option button—displays the chart in two-dimensional line format.
  - “Line width” spinbox—selects the width of the chart lines in pixels.

Color of axis/labels:

- Black option button—allows you to select black as the color of the axis and labels.
- White option button—allows you to select white as the color of the axis and labels.
- “Show grid” checkbox—enables or disables the display of the grid, the regular pattern of points on the chart which are used to determine the size and location of chart items.
- “Grid color” dropdown—allows you to define the color of the grid.
- “Background color” dropdown—allows you to define the graph background color.

  Be careful not to select the same color for both text and background, as it will render the text unreadable.

- “Samples per page” spinbox—allows you to define the number of samples you would like displayed on one page.

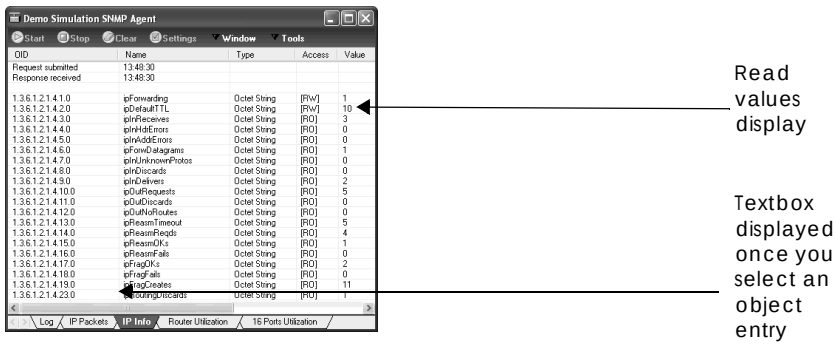
Collecting List Information

When you request agent information using the list format, SNMP Extension polls the agent once to receive a snapshot of agent objects defined in the list request.

Lists have only one limitation regarding type of object: they cannot display tabular objects. Lists can display text, IP addresses, descriptions, and numeric variables, but not tables.

> Lists are best for objects that have a one-to-one relationship. For example: a statistic that does not change, such as SystemName; or a statistic that does not have a variable number of data points, such as RouteMetrics. Tables are best to display items that may have a variable number of responses, such as a list of current connections by IP address.

To receive list information from an agent, select the Lists item in the SNMP Agents request area, then select the List tree item you wish to view.



List requests are created and modified using the MIB Editor. See “Using the MIB Editor” on page 354.

When you select a list menu request, SNMP Management Console sends the request to the agent and (if the agent is running and configured properly) receives a reply, which can be viewed in the list display in the agent information window. If necessary, SNMP Extension will re-send the request.

Read Values Display

Some objects in the list are writable, which means you can use SNMP Management Console to set the value of the object remotely. Writable objects display “[RW]” in the Access column of the display. Read-only objects show “[RO]” in the Access column.

Writable Object Setting

To define a setting for a writable object:

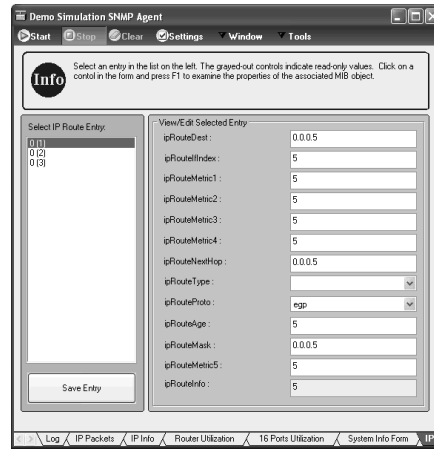
1. Select the writable object entry in the agent window.
2. Enter or select a new value for the object in the textbox that is displayed at the bottom of the window.
3. Click the SET button. SNMP Management Console sets the value of the writable object and repeats the original request to make sure that the value was changed.

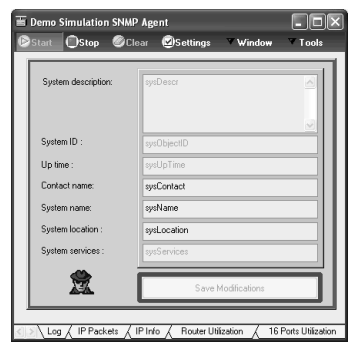
4. The updated list information will be displayed.

Collecting Forms Information

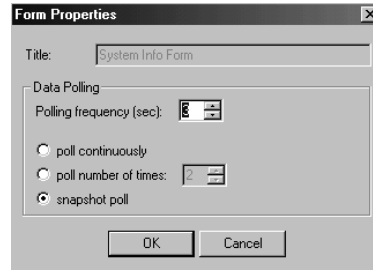
Forms are SNMP Management Console's way of displaying SNMP data in a flexible graphical format. Forms can be groups of items that show objects in a clean, colorful formatted view; bitmaps of devices with ports that change color, depending on the value of the SNMP response; or multiple-choice dropdown writable SNMP lists for configuring a server.

Any type of SNMP object can be placed on a form. Each object's display format can be adjusted to meet the needs of your display requirements. Example forms include an IP route form that allows you to view or set the status of multiple IP routes from the devices route table, or a System Information form that lets you set certain system information writable objects. Two sample forms follow:





To modify the sampling behavior of a form, right-click on the form and select FORM PROPERTIES. The **Form Properties** dialog will be displayed:



- "Title" textbox—displays the form's title.

  Note: The chart title can be changed only from the MIB Editor. If you attempt to make a change to a chart from either the Chart window or the SNMP Agent Request pane, a warning box is displayed:

  If you do not wish to receive further warnings that changes outside of the MIB Editor are not persistent, check the "Do not show this dialog in the future" checkbox. To reenable warnings, click Options > Observer General Options > SNMP and check the box entitled "Check this box to enable all optional hint messages."

Data Polling:

- "Polling frequency (sec)" spinbox—allows you to determine the polling frequency with which the MIB objects in the form will be polled. Enter a number between 1 and 999 manually, or use the arrow keys to set the polling frequency.
- poll continuously option button—allows you to select continuous sampling in which the MIB objects will be sampled every "n" seconds, where "n" is the frequency set.
- poll number of times option button and spinbox—allows you to select a set number of times in which the MIB objects will be sampled; the number of times is set in the spinbox attached to the option button.
- snapshot poll option button—allows you to select to have a snapshot poll of samples.

Forms are created and modified using the Forms Designer in the MIB Editor. List requests are created and modified using the MIB Editor. See "Using the MIB Editor" on page 354.

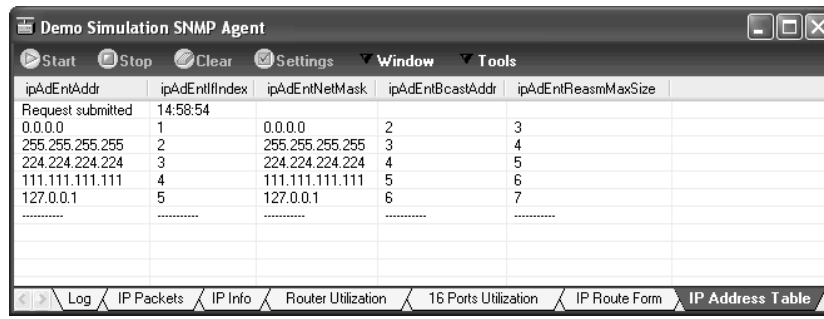
Collecting Table Information

SNMP tables are collections of different types of objects. Picture the SNMP table as a spreadsheet. Each row contains fields of data related to an object. Access to the SNMP MIB table is similar to reading the spreadsheet row by row.

SNMP works in the following way: SNMP Extension requests the values of all or some objects from the first line in the SNMP MIB table. After receiving a reply, it displays the values in the table and requests information for the next line. SNMP Extension continues

to collect information row by row until it reaches the end of the table. This process is called “traversing the table” in SNMP terminology.

To receive table information from an agent, select the table tree item in the SNMP Agent Request area, and double click on the table you wish to view.



Tables are created and modified using the Forms Designer in the MIB Editor. List requests are created and modified using the MIB Editor. See “Using the MIB Editor” on page 354.

Read Values Display

SNMP Extension will read the table and display the values of the table objects line by line. Tables can contain more than one writable object. Writable objects display “[RW]” in the Access column of the display. Read-only objects show “[RO]” in the Access column.

Writable Option Setting

To define a setting for a writable object:

1. Select the writable object entry in the agent window.
2. Enter or select a new value for the object in the textbox that is displayed at the bottom of the window.
3. Click the SET button. SNMP Management Console sets the value of the writable object and repeats the original request to make sure that the value was changed.
4. The updated list information will be displayed.

Depending on the type of table and the constraints imposed by the agent MIB design, you may be able to change the values of writable table objects, add additional lines to the table, or both.

Traps

An SNMP device may be configured by its manufacturer to send trap messages which notify the SNMP management station (in this case, SNMP Extension) of certain conditions. Unlike get and set requests, a trap message doesn’t require a request from SNMP Extension. It’s sent by the device automatically when there is an error, a certain

level of activity, or other condition. SNMP Extension collects incoming trap messages constantly.

> “Trap” and “trap message” are used interchangeably.

To receive trap messages with SNMP Management Console, SNMP Management Console's IP address must be included in the trap configuration table of the SNMP agent. Trap configuration is usually separate from general SNMP configuration.

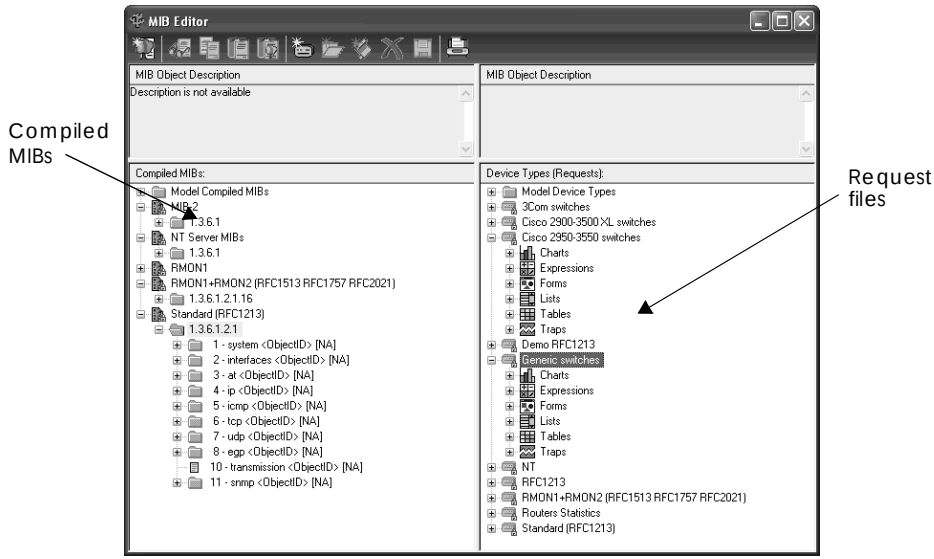
> If you configure one but not the other, you may be able to poll the SNMP agent, but receive no trap messages.

The SNMP agent doesn’t expect confirmation for trap messages. If the message doesn’t reach its destination, SNMP Management Console has no way of knowing the message was sent, and the agent has no way of knowing whether a message was received.

> Under normal circumstances most of the trap messages do reach their destinations. The limitation of traps comes from the lack of verification capabilities built into the relevant RFC specifications.

The MIB Editor

The MIB Editor is where MIBs are compiled and MIB objects are placed in requests to create SNMP Management Console lists, charts, tables, forms, and traps.



- MIB—a MIB is a text file in Abstract Syntax Notation One (ASN.1) format, which describes in a structured way the objects an SNMP device supports.
- Compiled MIBs—a compiled MIB is a binary file created from a MIB file in preparation for creating requests to be submitted to an SNMP agent.

- Device Types (Requests)—a request file is the actual file sent to an SNMP agent, polling and/or setting the states of various MIB objects or OIDs.

The MIB Editor displays compiled MIBs on the left pane of the window and request files on the right pane. Both compiled MIBs and requests are displayed in a familiar Windows tree format. The MIB Editor is used to compile MIBs and create/edit requests.

The MIB Editor Toobar

	Compile MIB File—causes SNMP Extension to compile a MIB file.
	MIB Object Properties—permits the setting of properties for the selected MIB object.
	Copy MIB Object—copies the selected MIB object to the Windows Clipboard.
	Paste MIB Object—pastes the selected MIB object from the Windows Clipboard onto the SNMP Requests pane of the MIB Editor.
	Paste Subtree—pastes the selected subtree from the Windows Clipboard onto the SNMP Requests pane of the MIB Editor.
	New Request File—creates a new request file in the SNMP Requests pane of the MIB Editor.
	New Request Folder—creates a new request folder in the SNMP Requests pane of the MIB Editor. Request folders are used to organize request files.
	Request Object—creates a new request object in the selected folder of the SNMP Requests pane of the MIB Editor.
	Delete a MIB or Request Object—deletes the selected object.
	Save Modified MIB Requests—saves the modified file. If the file has not been changed since the last save, this menu item will be grayed out.
	Print Agent Data—prints the data for the current agent, as configured.
	This simply prints the current state of the SNMP Request (right-hand) pane of the MIB Editor.

- Refresh the Current Request View—refreshes the display for the current request.

Using the MIB Editor

The following number of definitions may help in navigating the MIB editor dialogs.

MIB

MIBs are text files that the creator of an SNMP agent provides to describe the variables the particular agent keeps track of. These variables are called SNMP objects.

> Often, in the context of SNMP, they are simply referred to as “objects.”

MIBs have a very specific structure for the organization of objects; any SNMP management console (SNMP Management Console in this case) can use the MIB to form queries of the SNMP agent on a specific device. MIBs are supplied by the manufacturer of the device.

There are two logical sets of statistics that every agent (in theory) should keep track of:

- The standard MIB-2 (RFC1213) set or MIB-1 (RFC1066), and
- Any proprietary MIB(s) objects.

SNMP is structured this way so that each device can offer standard (MIB-1/2) data that would be common between all network devices (e.g., packets in, packets out), and data that is device-specific (like number of sheets printed on a network printer). MIB-2 is a superset of MIB-1. Sometimes these two sets of MIB objects are combined into one MIB file. Other times you may find that the manufacturer only provides you with a proprietary MIB and expects you to use the RFCMIB-2 (or MIB-1) to view the standard data objects. Unfortunately, there are manufacturers that only offer a subset of objects in the standard MIB(s). In these cases, you can ask the agent for the objects that are missing, but the agent will not respond.

> All SNMP agents keep track of some or all of the objects in the standard MIBs (MIB-1 or MIB-2). If you do not have access to a proprietary MIB for your device, you may be able to get all the information you require from the standard MIBs.

A Request File

A request file is built within SNMP Management Console to organize, group, and define specific SNMP requests that may be made of an agent. Each request can be for one or more SNMP objects, and the response to the request may be displayed in list, chart, table, or form format. A number of request files come with SNMP Management Console, but in general, request files are built by you to suit your specific needs with regards to the matrix that your site needs to collect.

When SNMP Management Console polls an SNMP agent for information, a request allows it to receive information about many different objects simultaneously. You can create your own requests (or edit the requests provided) using the MIB Editor.

Compiled MIBs

SNMP Management Console compiles the MIB prior to using it to create requests. This is done to save on memory when parsing request responses and to make drag-and-drop request building faster.

Your path to begin building requests (lists, charts, tables, or forms) will begin by determining whether SNMP Management Console includes a suitable MIB for your device. See “Building Requests” on page 357.

If you have a specific MIB that was included with your device, you should begin by compiling the MIB. See “Compiling MIBs” below.

If you do not have a specific MIB for your device and the device is not listed on the list of MIBs, you can still use the standard MIBs to create requests for that device. In that case, you will use the standard RFC1213 or RFC1066 MIB to build your requests.

Compiling MIBs

Prior to building a request, you may need to compile a MIB. You will need to do this if you have a MIB that was distributed with your device or have received a new MIB for a device. If you don’t have a specific MIB for your device and want additional information on what the standard MIBs provide, you must obtain a MIB from the manufacturer.

Once you have the MIB, you compile it using the MIB Editor. Compiling the MIB is not much more complicated than opening a file. However, some companies do not strictly follow the MIB file format, so you may need to modify the MIB text file. Also, after compiling the MIB file, you must create your own requests.

The MIB Compiler parses MIB text files and converts them into a format that can be used by SNMP Management Console and its utilities. The MIB Compiler is used when you don't have a pre-compiled MIB for a particular SNMP device. You may also need to use the MIB Compiler to recompile a MIB after editing the device MIB file (for example, to correct an error in a manufacturer-supplied MIB file) or to update a manufacturer-supplied MIB file for a new device.

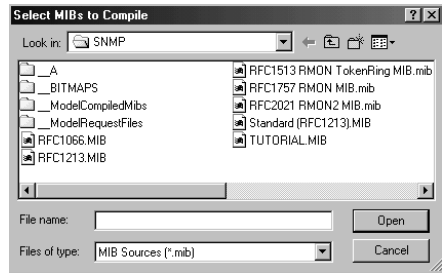
The MIB Compiler expects ASN1-formatted MIB text files which have the MIB Management Console (e.g., RFC1213.MIB).

> ASN.1 (Abstract Syntax Notation One) is the standard way, defined by two ISO (International Organization for Standardization) standards, to describe a message that can be sent or received in a network.
>
> ASN.1 is defined in two different places:
>
> the rules of syntax for describing the contents of a message in terms of data types and content sequence or structure is defined by the ISO 8824/ITU X.208 standard.

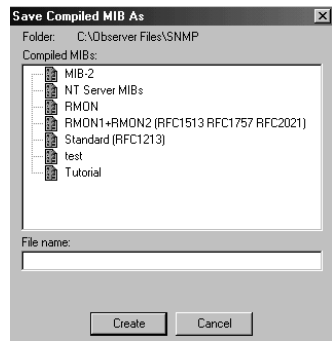
how you actually encode each data item in a message is defined by the ISO 8825/ITU X.209 standard.

The Compile Process

1. To compile a new MIB, open the MIB Editor by selecting Tools > SNMP MIB Editor or click on the SHOW MIB EDITOR icon from the main button bar.
2. Select Mode Commands > Compile MIB File to open the **Import MIB Source** dialog to display files to select for compiling.



3. Select the MIB file (*.MIB) you wish to compile. The **Save Compiled MIB As** dialog will be displayed.



4. Insert the desired file name and click on the CREATE button.
5. The MIB will be compiled and the resulting file (with a .MIC extension) will be placed in the Observer Files\SNMP directory.

6. Once the MIB is successfully compiled, it will be automatically listed in the MIB Editor with the other compiled MIBs.

7. Should the compiler have problems compiling your MIB, the compiler will exit to the **MIB Editor** and the log will display the errors, listing which MIB line caused the error. Click the EDIT SOURCE button to edit the MIB file and correct the error.
8. After correcting the error, simply compile the MIB again. If there are any further errors, the compiler will stop again. Repeat until the MIB successfully compiles.

Building Requests

As described earlier in this section, requests are built from MIB objects and can be displayed in list, chart, table, or form format. Requests are grouped together in a request file. Request files contain folders for each format of request: chart, list, table, form, and trap.

SNMP Management Console includes a number of pre-built request files that can be used as is or modified to suit your specific needs. Most users will find that the included request files, possibly modified, will serve quite well.

Requests can contain objects from one MIB or many separate MIBs. Once built and saved, requests are displayed in a tree structure for each agent that the request file is associated with.

When adding a new SNMP Agent, you must specify a request file. All configured requests for the agent become available each time the newly-registered SNMP agent entry is selected. You can remove requests from an agent or add newly-created requests to an agent using the MIB Editor.

To receive information about an object, SNMP Management Console polls an SNMP agent by sending a request packet. The request packet can combine one or more object IDs. When the agent receives the request, it searches its databases, retrieves object values, composes a reply, and sends the reply as a reply packet back to SNMP Management Console.

The structure of the SNMP polling process suggests that an SNMP request can be considered a single object. By combining several SNMP objects in a single request, the same requests can be used for all SNMP agents using the same MIB.

The MIB Editor provides this functionality for SNMP Management Console by allowing you to design requests for each agent. When you configure a new SNMP agent, you designate its request file in the **SNMP Agent Properties** dialog.

Why Build Custom Requests?

The request files that are included as part of the SNMP Management Console package will serve most user's needs most of the time; however, there may be situations where it can be advantageous to build custom requests. RFC1213 includes methods for manufacturers to define SNMP objects not specifically defined (in effect, proprietary MIB objects). In some cases, a manufacturer may not have precisely adhered to the RFC1213 specification and mislabelled an object.

Custom requests allow the SNMP Management Console to work with SNMP agents that interact with objects not directly defined in RFC1213, and in dealing with badly-formed SNMP agents.

Another advantage of custom requests is the ability to share them. For example, a network administrator in a large corporation may need to create a periodic report about network traffic. Four other network administrators from the same corporation, located in different states, must create similar reports about their network segments. By creating a single, uniform custom request, it is possible to easily compare the performance of the network segments on the important criteria.

Yet another advantage of custom requests is to avoid data overload. While SNMP and its proprietary features can provide a mountain of information, only some of it will be relevant in a given situation. By either modifying standard requests to eliminate extraneous data, or by creating custom requests from scratch, you will be able to create displays of information that are useful to your specific situation. For example, RFC1213 defines twenty different ICMP objects, but much of the time, most network administrators will find themselves interested in only one or two. By creating a custom chart, the network administrator can focus more on what's relevant by eliminating the display of the extraneous.

Custom requests also provide a way for one network administrator to:

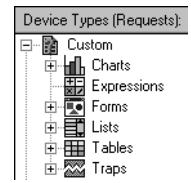
- Design a standard for obtaining exactly the information needed;
- Prepare information in a way more easily understood by less technically-oriented people, and;
- Share the standard with other administrators.

Through discussion and testing, a comprehensive set of custom requests can be developed to obtain consistent sets of data customized for an organization's particular needs.

Creating A Custom Request File

1. To create a custom request file, from the MIB Editor select Mode Commands > New Request File or click on the NEW REQUEST FILE icon .
2. The **Add New Device Type** dialog will be displayed.

3. Name the request file.
4. Leave the "Add default RFC1213 requests to the new file" checkbox selected, if desired.
5. Click the CREATE button.
6. The new request tree on the right hand side of the MIB Editor will be displayed. Note the new request items that are now available: Charts, Expressions, Forms, Lists, Tables, and Traps.



Building and Modifying Charts

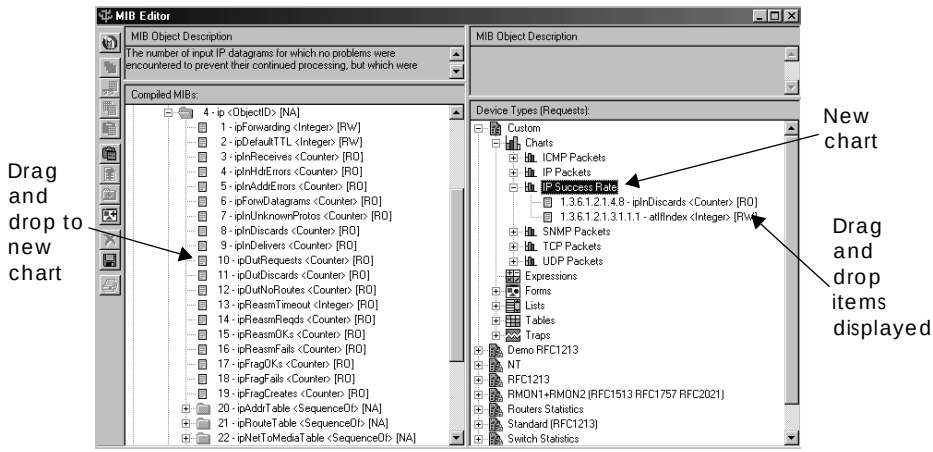
Much of what is done in the MIB Editor when building and modifying charts is similar to what can be done from the Agent Display window. There are two significant differences when modifying a chart from the MIB Editor:

- Changes, once saved, are permanent. When changes are made from the Agent Display, they are for that session only.
- More features of the chart can be modified by the MIB Editor.

Charts are indicated in the MIB Editor by the icon.

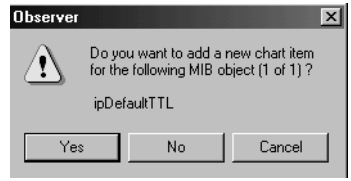
1. To create a new, blank chart, right-click on Charts and select NEW CHART. A new chart, entitled “New Chart” will be created.
2. Drag-and-drop any non-table MIB object from the left-hand pane of the MIB Editor onto the chart (remember: charts cannot display tabular data).

A MIB object can be copied from any available compiled MIB.

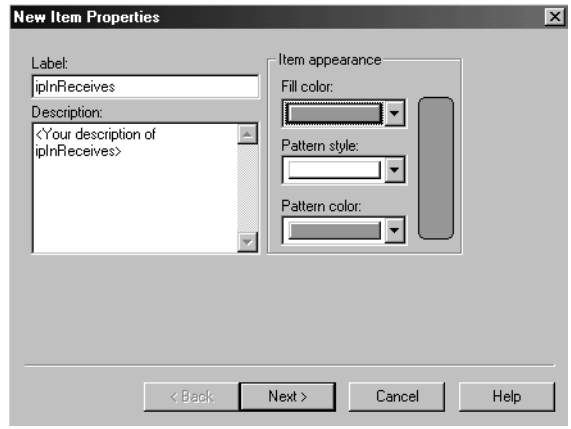


Only those MIB objects that have been copied to the chart can be monitored by the chart.

While it’s certainly possible to copy a myriad of MIB objects to the chart and only use a few, it’s generally a better idea to copy only those objects you plan on charting with that particular chart.



Click on the YES button to display the **New Item Properties** dialog.



- "Label" textbox—allows you to enter a label name for the chart item; the default name is from the list of Compiled MIBs you are dragging and dropping from.
- "Description" textbox—allows you to enter a description of the chart item.

Item Appearance:

- "Fill color" dropdown—allows you to select the fill color for the chart item.
- "Pattern style" dropdown—allows you to select the pattern style for the chart item.
- "Pattern color" dropdown—allows you to select the pattern color for the chart item.
- The example box (to the right of the three dropdown boxes) shows how the combination will appear.

Click NEXT to continue on to the **Attached MIB Object** dialog.

Attached MIB Object

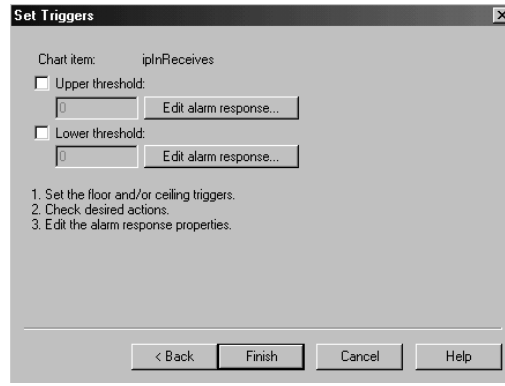
- "ID" display—allows you to view the ID label for the chart item.
- "Name" display—allows you to view the MIB Object name.
- "Type" display—allows you to view the MIB Object type.
- "Access" display—allows you to view whether the MIB Object is read-only or read-write.
- "Enumerated values" display—allows you to view the enumerated values to be displayed by the MIB Object.
- "Description" display—allows you to view the description of the chart item.

Request Specific:

- Absolute value option button—when selected, allows you to receive absolute values for the MIB Object.

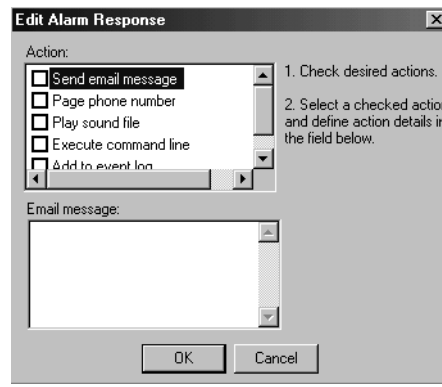
Click NEXT to continue on to the **Set Triggers** dialog.

Set Triggers



- "Chart item" display—allows you to view the chart item name.
- "Upper threshold" checkbox—when selected, allows you to enable triggers for upper thresholds of the chart item.
- "Upper threshold" textbox—when the "Upper threshold" checkbox is selected, this box will be enabled and you can set the upper threshold values.
- "Lower threshold" checkbox—when selected, allows you to enable triggers for lower thresholds of the chart item.
- "Lower threshold" textbox—when the Lower threshold checkbox is selected, this box will be enabled and you can set the lower threshold values.
- Edit alarm response buttons—displays the Edit Alarm Response dialog.

Edit Alarm Response



- "Action" checkboxes—allow you to enable any action in response to a threshold:
  - Send email message

- Page phone number
- Play sound file
- Execute command line
- Add to event log

These actions can be configured independently. It is possible to configure any, all, or none of these to be executed when a threshold is reached.

- "Email message" textbox—allows you to enter an email message to be sent.

Chart Items Tab

When agent information is displayed in chart format, several options are available for customizing the display. To define the settings, right-click on the Chart and select PROPERTIES. The **Chart Properties** dialog will be displayed. See "Chart Properties – Chart Items Tab" on page 346.

Chart Properties Tab

See "Chart Properties – Chart Properties Tab" on page 346.

Building Expressions

Expressions permit you to take SNMP agent data and derive useful mathematical results.

Raw data that SNMP Management Console receives from SNMP agents can be very useful but, often it's only the starting point. An SNMP agent on a switch may keep track of the number of data packets the switch has received, the number of packets it has discarded, and the number of packets it has passed along. However, the network administrator may be more interested in the percentage of packets discarded since this may signal a problem with the system.

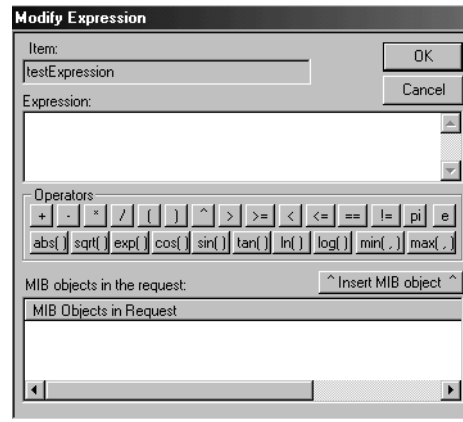
Expressions are indicated in the MIB Editor by the icon.

1. To create a new expression, from the MIB Editor, click on Expressions, then select Mode Commands > New Expression or right-click and select NEW EXPRESSION)

2. From the left pane of the MIB Editor, select any MIB objects that you intend to use in the expression and drag-and-drop them on the new expression.

> There may be a slight performance penalty caused by including unnecessary MIB objects in an expression. In terms of system efficiency, it's best to add only those you need. If you find you need additional MIB objects to create your expression, you can easily add them at a later time by the same drag-and-drop method.

3. Right-click on the new expression to rename it, if desired.
4. Right-click on the renamed expression and select EDIT EXPRESSION to display the **Modify Expression** dialog.


Modify Expression
Item:
testExpression
OK
Cancel
Expression:
Operators
+ - * / ( ) ^ > >= < <= == != pi e
abs( ) sqrt( ) exp( ) cos( ) sin( ) tan( ) ln( ) log( ) min(,) max(,)
MIB objects in the request:
^ Insert MIB object ^
MIB Objects in Request

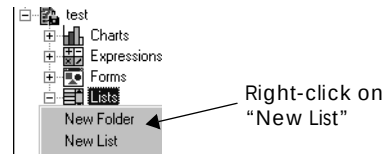
The **Modify Expression** dialog box is, in effect, a numeric calculator, permitting the creation and modification of mathematical expressions using selected MIB objects, constants, and mathematical operations.

5. Numbers can be entered from the keyboard; mathematical functions can be entered either via the keyboard, or from the buttons of the dialog. The INSERT MIB OBJECT button can be used to insert MIB objects that have been dragged to the expression.
6. Click OK to save the edited expression.

Now that the new expression has been built, it can be used in a chart. See “Building and Modifying Charts” on page 359.

Building List and Table Requests

1. To create a new list, from the MIB Editor, click on “Lists,” then select Mode Commands > New List Request or right-click and select NEW LIST.



2. SNMP Management Console will create a new list. Rename the list whatever you find appropriate.
3. Open the MIB tree for the MIB you would like to use.
4. Display the objects you want to include on your list, highlight the objects, and drag the objects from the MIB tree listing to the request file tree.

You may use MIB objects from two or more different compiled MIBs.

5. Once complete, select Mode Commands > Save Request File. The new list will be available for all Agents that use this request file.

The same actions can be taken to build tables.

Building Trap Requests

A trap is an event that an SNMP Agent (the actual hardware or software agent, not SNMP Management Console's Agent request) can be configured to automatically report to the management program, in this case SNMP Extension. RFC1157 defines seven traps, any, all, or none of which may be supported by a given SNMP Agent.

> To find out which, if any, SNMP traps your device supports, please consult the documentation for that device.

When the Agent has been configured to report a trap and a trap event occurs, the Agent will report the trap to the management program without having to be polled.

For example, one defined trap is the coldStart trap. A device with an SNMP agent that supports this trap will issue this trap when the device is performing a "cold" boot (or reboot), one where the device's configuration or implementation may be altered. Another is the warmStart trap, which is issued when a "warm" boot is occurring.

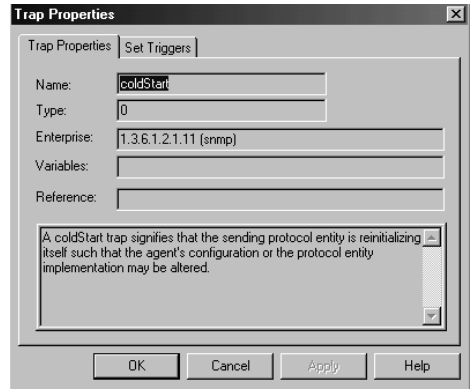
The advantage of a trap is that the management program does not have to repeatedly query the agent for the trap condition. Like an alarm clock going off at a pre-set time, when a configured trap event occurs, it notifies SNMP agent without having to be asked.

There are some inherent limitations to traps. A trap can only be sent from a properly-functioning SNMP Agent, so it's impossible for a router to send a trap announcing that it's down. Since a trap is configured in the SNMP Agent itself, it's relatively inflexible. Further, since traps are sent via UDP (a protocol that does not include method for verifying that a packet has been received), the SNMP Agent has no way of knowing if the trap has been received and acted on.

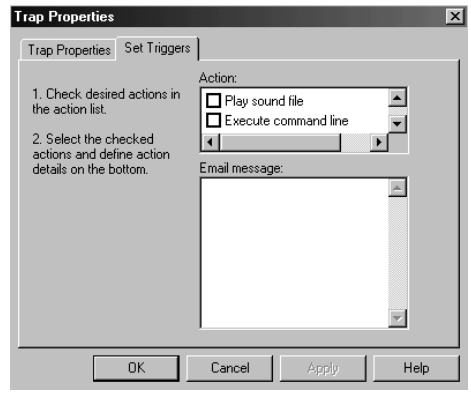
Traps are indicated in the MIB Editor by the icon.

1. To add a trap to an SNMP request, simply drag a trap from a compiled MIB and drop it on the trap tree of the MIB request.
2. Right-click on the trap to bring up the **Trap Properties** dialog. The boxes on the Trap Properties tab will always be grayed out, as there is no configuration of the traps themselves; traps are simply either monitored or not monitored by SNMP Management Console.

3.



4. Click on the “Set Triggers” tab to configure the trap’s alarms and to display the Set Triggers tab.



Alarm actions can be set independently. It is possible to configure some, none, or all of the possible alarm actions to happen when the trap is received.

Actions:

- “Send email message” checkbox—if selected, a triggering event will cause an email message to be sent to a designated recipient as configured in Options > Observer General Options > Email Notifications. (See “Setting up Email Notifications” on page 245.) Enter the message in the “Email message” textbox.
- “Page phone number” checkbox—if selected, a triggering event will cause a pager message to be sent to the recipient designated in Options > Observer General Options > Phone Pager. See “Observer General Options–Notifications Tab” on page 235.
- “Play sound file” checkbox—if selected, a triggering event will cause a sound file to be played.

- “Execute command line” checkbox—if selected, a triggering event will cause a DOS or Windows program to be run.

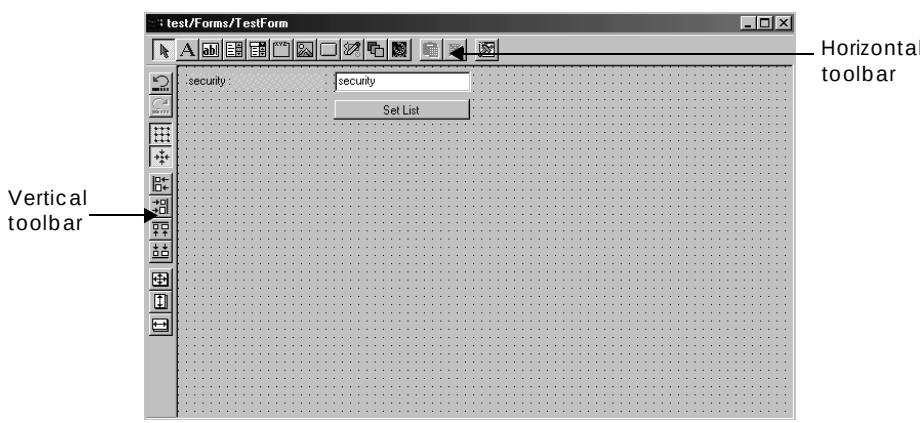
  Only one command will be executed. If you need or wish to have more than one program run, you may set up a batch file (e.g., WARNINGS.BAT) as the command line to be executed. You can then use a text editor to create WARNINGS.BAT and enter multiple commands in that batch file.

Designing and Building Forms

SNMP Extension's Forms Editor is a full-function forms designer enabling you to display information in a variety of formats and to actively interact with SNMP devices. While SNMP Management Console comes with several sample forms, it is possible for you to design custom forms.

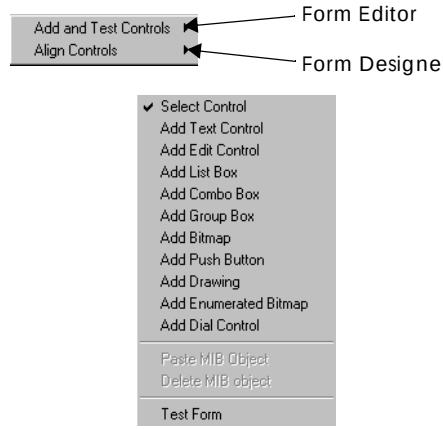
Forms are indicated in the MIB Editor by the icon.

1. To build a new form, from the MIB Editor, click on “Forms,” then select Mode Commands > New Form Request or right-click and select NEW FORM.
2. SNMP Management Console will create a new form. Rename the form whatever you find appropriate.
3. Open the MIB tree for the MIB you would like to use.
4. Display the objects you want to include on your list, highlight the objects, and drag the objects from the MIB tree listing to the Request file tree.
5. Right-click on the form and select EDIT FORMS CONTROL to display the **Form Editor** dialog.



A form consists of an arrangement of one or more controls and drawing objects on the form. Controls can display SNMP and other information and, in some cases, allow the user to interact with an SNMP agent. Controls and drawing objects are created and manipulated from Mode Commands or from the two toolbars of the Form Editor.

When the Form Editor is active, Mode Commands contains the following items:



- Select Control—permits the selection of one or more controls and drawing objects. Click on one object to select it; either Control-click on several objects or draw a bounding outline to select multiple objects.
- Add Text Control—permits the creation of a text control on the form. Click anywhere on the form to create a text control at that point.
- Add Edit Control—permits the creation of an edit box control on the form. Click anywhere on the form to create an edit box control at that point.
- Add List Box—permits the creation of a list box control on the form. Click anywhere on the form to create a list box control at that point.
- Add Combo Box—permits the creation of a combo box control on the form. Click anywhere on the form to create a combo box control at that point.
- Add Group Box—permits the creation of a group box control on the form. Click anywhere on the form to create a group box control at that point.
- Add Bitmap—permits the insertion of a bitmap into the form. Click anywhere on the form to insert a bitmap at that point.
- Add Push Button—permits the insertion of a button control into the form. Click anywhere on the form to insert a button at that point.
- Add Drawing—permits the insertion of a drawing into the form. Click anywhere on the form to insert a drawing at that point.
- Add Enumerated Bitmap—permits the insertion of an enumerated bitmap control into the form. Click anywhere on the form to insert an enumerated bitmap at that point.
- Add Dial Control—permits the insertion of a dial control into the form. Click anywhere on the form to insert a dial control at that point.
- The following two items will be grayed out if unavailable:

- Paste MIB Object—permits the insertion of a MIB object that has been cut or copied to the Windows Clipboard.
- Clear MIB Object—permits the deletion of a MIB object.

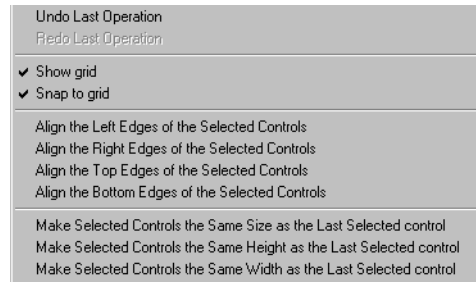
- Test Form—toggles the form between Edit Mode and Preview Mode. In Preview Mode, while the form will not display any actual data, it is possible to test buttons and dropdown forms.

The horizontal toolbar contains the following buttons, which correspond to their equivalent entries on the MODE COMMANDS menu.

	Select Control
	Add Text Control
	Add Edit Control
	Add List Box
	Add Combo Box
	Add Group Box
	Add Bitmap
	Add Push Button
	Add Drawing
	Add Enumerated Bitmap
	Add Dial Control
	Paste MIB Object

	Delete MIB Object
	Test Form

When the Forms Designer is active, Mode Commands > Align Controls submenu contains the following items:


Undo Last Operation
Redo Last Operation
Show grid
Snap to grid
Align the Left Edges of the Selected Controls
Align the Right Edges of the Selected Controls
Align the Top Edges of the Selected Controls
Align the Bottom Edges of the Selected Controls
Make Selected Controls the Same Size as the Last Selected control
Make Selected Controls the Same Height as the Last Selected control
Make Selected Controls the Same Width as the Last Selected control

- Undo Last Operation—reverses the action of the last operation on the form.

  Saving the form will clear the undo buffer.

- Redo Last Operation—reverses the action of the last undo operation on the form. Saving the form will clear the redo buffer.
- Show grid—toggles the display of the grid, the rectangular array of points on the form.
- Snap to grid—toggles whether or not objects moved or placed on the form near grid points will be “snapped” or automatically moved into contact with those grid points.
- Align the Left Edges of the Selected Controls—causes the left edges of selected controls or objects on the form to be aligned on the left side.
- Align the Right Edges of the Selected Controls—causes the right edges of selected controls or objects on the form to be aligned on the right side.
- Align the Top Edges of the Selected Controls—causes the top edges of selected controls or objects on the form to be aligned on the top side.
- Align the Bottom Edges of the Selected Controls—causes the bottom edges of selected controls or objects on the form to be aligned on the bottom side.
- Make the Selected Controls the Same Size as the Last Selected control—causes the selected controls or objects to become both the same height and width as the last selected control.
- Make the Selected Controls the Same Height as the Last Selected control—causes the selected controls or objects to become the same height as the last selected control.

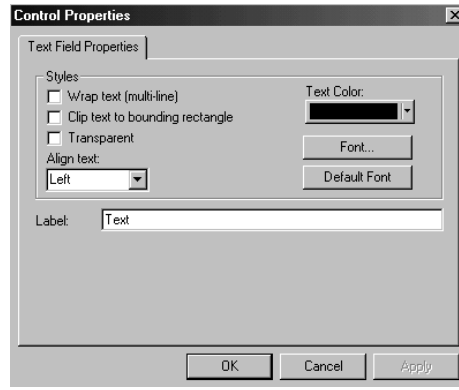
- Make the Selected Controls the Same Width as the Last Selected control—causes the selected controls or objects to become the same width as the last selected control.

The vertical toolbar contains the following buttons, which correspond to their equivalent entries on the MODE COMMANDS menu:

	Undo Last Operation
	Redo Last Operation
	Show Grid
	Snap to Grid
	Align the Left Edges of the Selected Controls
	Align the Right Edges of the Selected Controls
	Align the Top Edges of the Selected Controls
	Align the Bottom Edges of the Selected Controls
	Make the Selected Controls the Same Size as the Last Selected Control
	Make the Selected Controls the Same Height as the Last Selected Control
	Make the Selected Controls the Same Width as the Last Selected Control

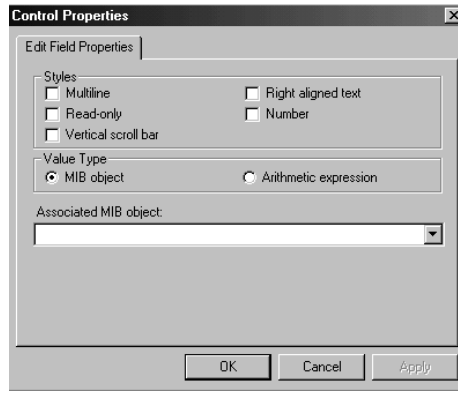
Each of the controls or objects has its own properties dialog which is accessed by selecting the control or object and right-clicking on it.

Text Field Properties



- “Wrap text (multi-line)” checkbox—allows you to break between words and wrap to multiple lines.
- “Clip text to bounding rectangle” checkbox—allows you to set the text to be aligned or clipped to the bounding rectangle of the textbox.
- “Transparent” checkbox—allows you to set the text box to be transparent.
- “Align text” dropdown—allows the text to be aligned left, centered, or right.
- “Text Color” dropdown—allows you to select the text color from a color palette.
- Font button—permits the selection of the font for the current text box. This selection overrides the default font selection.
- Default Font button—permits the selection of a default font for text boxes, setting the font that will be used when no font is specified, as above.
- “Label” textbox—allows you to add text that will be shown in the text object.

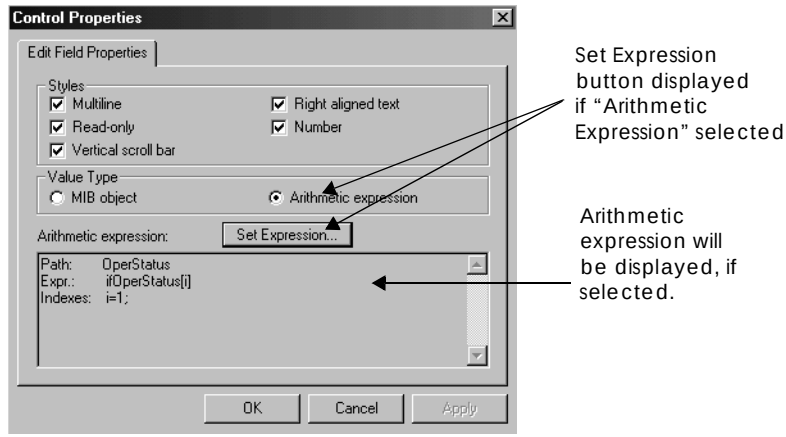
Edit Field Properties



- "Multiline" checkbox—if selected, the text will break between words and wrap to multiple lines.
- "Read-only" checkbox—if selected, prevents you from being able to change the associated MIB information, even if the MIB object is writable.
- "Vertical scroll bar" checkbox—if selected, adds a vertical scroll bar to the object, allowing you to scroll up or down to see hidden information.
- "Right aligned text" checkbox—if selected, the text will be aligned to the right side of the box.
- "Number" checkbox—if selected, the edit box will display only numbers, rather than alphanumeric characters.
- Value Type option button—when selected, the edit object displays a MIB object.
  - MIB OBJECT option button—allows you to select among MIB objects attached to the form.
  - "Associated MIB object" dropdown—if the MIB OBJECT option button is selected, this dropdown box is displayed permitting you to select among the MIB objects attached to the form.

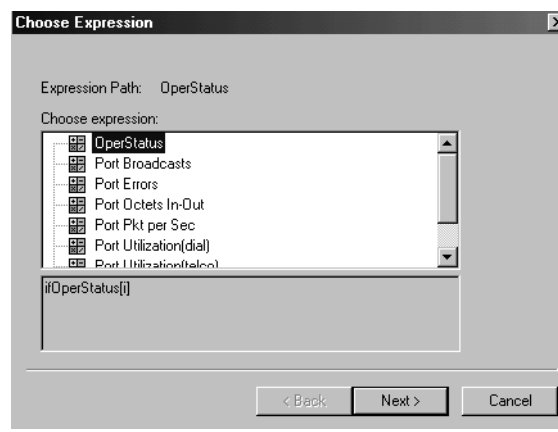
    If the dropdown box is blank, no MIB object has been attached to the form. To attach a MIB object or some MIB objects to a form, simply select one or more MIB objects from the left pane of the MIB Editor and drag-and-drop them onto the form.
- Arithmetic expression option button—when selected, the edit object displays an arithmetic expression.

- If the Arithmetic expression option button is selected, the bottom pane of the dialog will include a SET EXPRESSION button



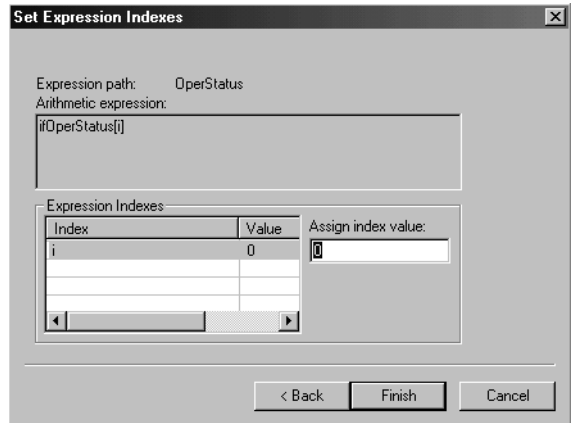
Setting an Expression

1. Click the SET EXPRESSION button. The **Choose Expression** dialog box will be displayed.



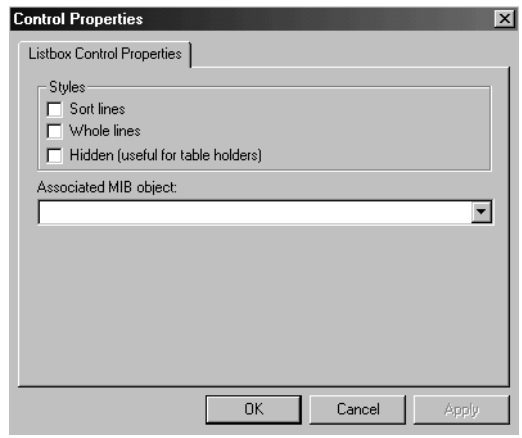
2. The upper pane will contain those expressions available in the present SNMP request. Select any expression and click the NEXT button.

3. The **Set Expression Indexes** dialog will be displayed.



4. Select the index you wish to modify and enter your chosen value in the "Assign index value" textbox. Click the FINISH button.
5. The **Edit Field Properties** dialog will be redisplayed.

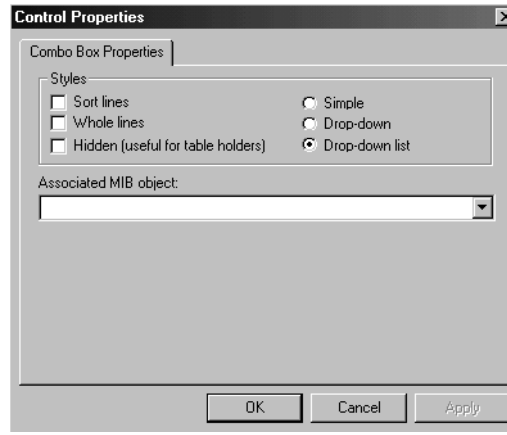
List Box Properties



- "Sort lines" checkbox—if selected, the items in the list box will be sorted alphabetically.
- "Whole lines" checkbox—if selected, the list box will display a whole number of lines, rather than permitting fractional lines.
- "Hidden (useful for table holders)" checkbox—if selected, the table will be hidden on the form. The primary use for this is for table holders that will be used elsewhere in the form.

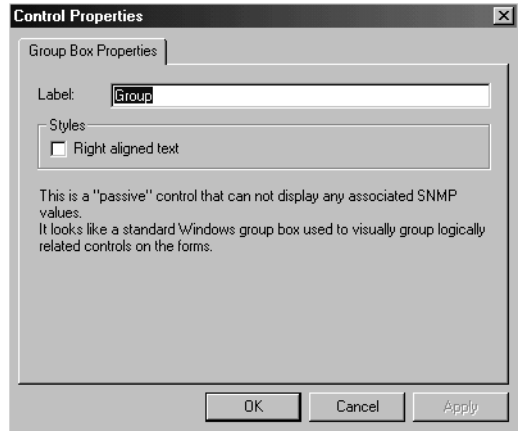
- “Associated MIB object” dropdown—allows you to choose among the MIB objects attached to the form.

Combo Box Properties



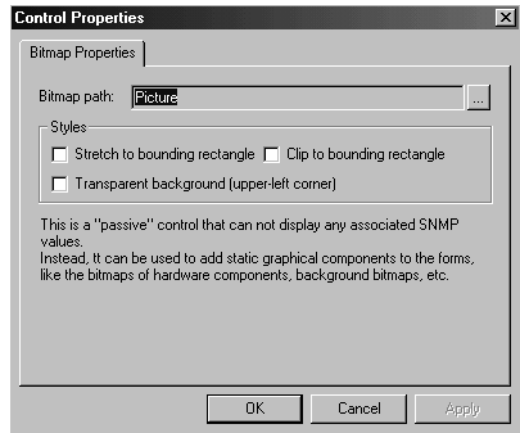
- “Sort lines” checkbox—if selected, the lines in the list box will be sorted in alphanumeric order.
- “Whole lines” checkbox—if selected, the list box will display whole number of lines, rather than permitting fractional lines.
- “Hidden (useful for table holders)” checkbox—if selected, the table will be hidden on the form. The primary use for this is table holders that will be used elsewhere in the form.
- Simple option button—if selected, the combo box will be a simple list.
- Dropdown option button—if selected, the combo box will be a dropdown box.
- Dropdown list option button—if selected, the combo box will be a dropdown list.
- “Associated MIB object” dropdown—allows you to select the MIB object to be associated with the combo box.

Group Box Properties


Control Properties
Group Box Properties
Label:
Group
Styles
Right aligned text
This is a "passive" control that can not display any associated SNMP values.
It looks like a standard Windows group box used to visually group logically related controls on the forms.
OK
Cancel
Apply

- “Label” textbox—allows you to add a descriptive label for the group box.
- “Right aligned text” checkbox—if selected, the text in the group box will be right aligned.

Bitmap Properties

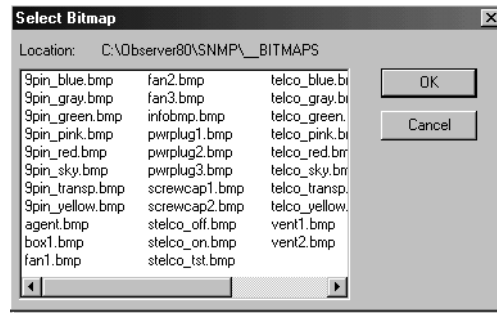

Control Properties
Bitmap Properties
Bitmap path:
Picture
...
Styles
Stretch to bounding rectangle
Clip to bounding rectangle
Transparent background (upper-left corner)
This is a "passive" control that can not display any associated SNMP values.
Instead, it can be used to add static graphical components to the forms, like the bitmaps of hardware components, background bitmaps, etc.
OK
Cancel
Apply

- “Bitmap path” display—allows you to view the bitmap path.
- “Bitmap path” selection box—allows you to select the bitmap to be displayed on the form. Click on the ... button to select the bitmap. The Select Bitmap dialog will be displayed. See “Select Bitmap Dialog” on page 379.

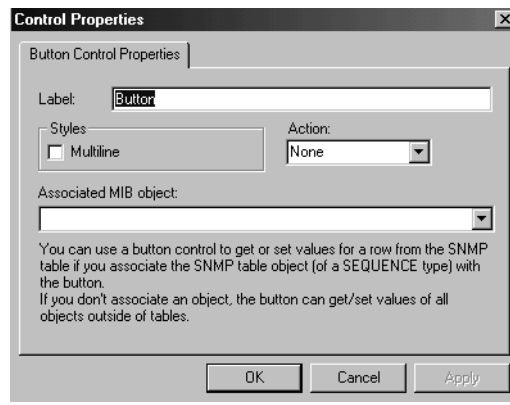
Styles:

- “Stretch to bounding rectangle” checkbox—if selected, the bitmap will be stretched to the limits of the rectangular boundary, even if that requires a horizontal or vertical distortion of the image.
- “Clip to bounding rectangle” checkbox—if selected, the bitmap will be clipped or trimmed at its rectangular boundary.
- “Transparent background (upper-left corner)” checkbox—if selected, the bitmap will be displayed in the upper left corner of the bitmap object’s rectangular boundary, with the rest of the rectangular boundary of the bitmap object being transparent.

Select Bitmap Dialog



Button Control Properties


Control Properties
Button Control Properties
Label:
Button
Styles
Multiline
Action:
None
Associated MIB object:
You can use a button control to get or set values for a row from the SNMP table if you associate the SNMP table object (of a SEQUENCE type) with the button.
If you don't associate an object, the button can get/set values of all objects outside of tables.
OK
Cancel
Apply

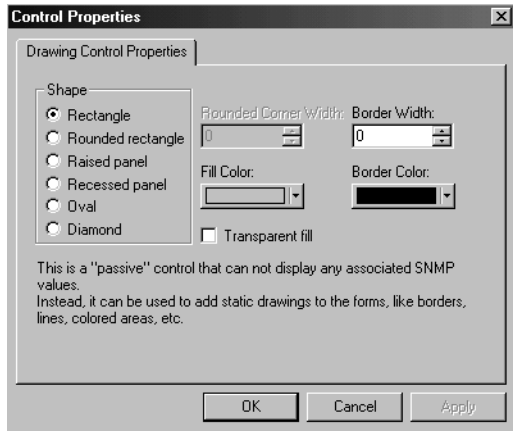
- “Label” textbox—allows you to enter the text that will be shown in the button object.

Styles:

- “Multiline” checkbox—if selected, allows the button to have more than one line of text.
- “Action” dropdown—allows you to determine which action will occur when the form button is clicked. You can select from None, SNMP Get, and SNMP Set.

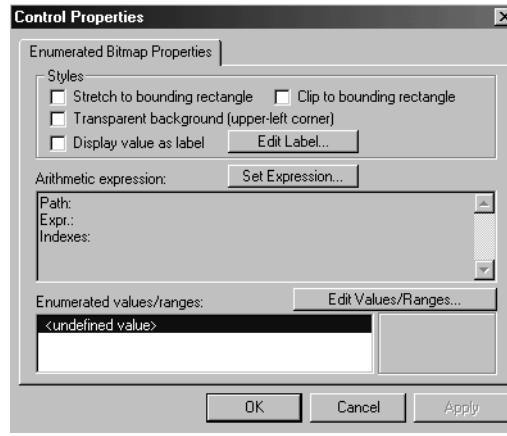
- “Associated MIB object” dropdown—allows you to select which of the MIB objects attached to the form will be polled or set when the button is clicked.

Drawing Control Properties



- Shape option buttons—allows you to select from one of the following shapes: rectangle, rounded rectangle, raised panel, recessed panel, oval, or diamond for the drawing object.
- “Rounded Corner Width” spinbox—allows you to set the width of the rounded corners in a rounded rectangle drawing object; only active if you have selected the Rounded rectangle option button.
- “Border Width” spinbox—allows you to set the width, in pixels, of the object’s border.
- “Fill Color” dropdown—allows you to set the fill color for the object.
- “Border Color” dropdown—allows you to set the border color for the object.
- “Transparent fill” checkbox—if selected, will gray out the Fill Color box and cause the contents of the drawing box to be transparent, allowing any object on which it is placed to show through the contents of the box. The border will not be transparent.

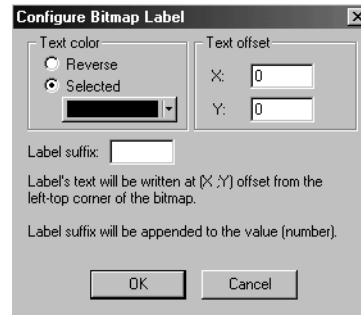
Enumerated Bitmap Properties



Styles:

- “Stretch to bounding rectangle” checkbox—if selected, the bitmap will be stretched to the limits of the rectangular boundary, even if that requires a horizontal or vertical distortion of the image.
- “Clip to bounding rectangle” checkbox—if selected, the bitmap will be clipped or trimmed at its rectangular boundary.
- “Transparent background (upper-left corner)” checkbox—if selected, the bitmap will be displayed in the upper left corner of the bitmap object’s rectangular boundary, with the rest of the rectangular boundary of the bitmap object being transparent.
- “Display value as label” checkbox—if selected, the value of the expression to be displayed as the label of the enumerated bitmap.
- Edit Label button—displays the Configure Bitmap Label dialog. See “Configure Bitmap Label” on page 382.
- Arithmetic expression—displays and configures the arithmetic expression that the enumerated bitmap will represent, as well as the indexes, if any.
- Set Expression button—displays the Choose Expression dialog. See “Setting an Expression” on page 375.
- Enumerated values/ranges—displays and configures the bitmap that will be displayed in response to values of the selected expression.
- Edit Values/Ranges button—displays the Edit Ranges/Values dialog. See “Edit Ranges/Values” on page 383.

Configure Bitmap Label



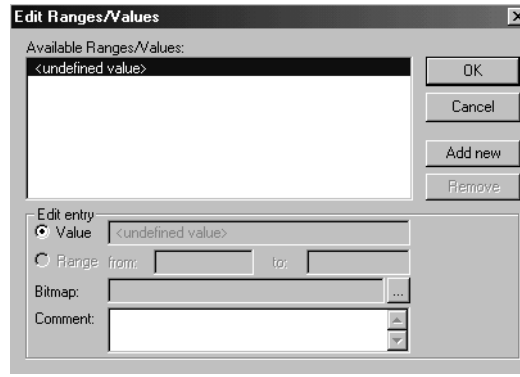
Text color:

- Reverse option button—if selected, the label's text color will be the reverse of the background color.
- Selected option button—if selected, you can choose a text color using the dropdown box.
- "Color" dropdown—allows you to select the text color; only active if you have selected the Selected option button.

Text offset:

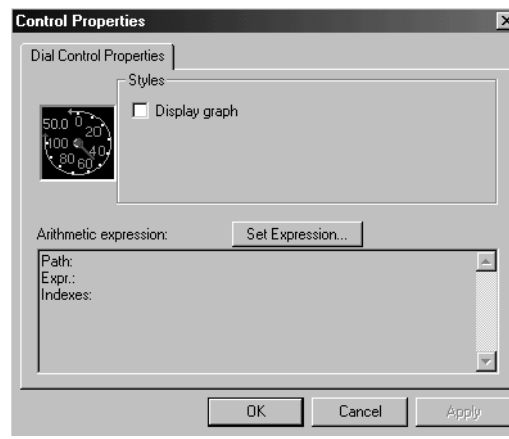
- "X" textbox—allows you to set the offset, in pixels from the upper left corner of the bitmap, where the label will be placed.
- "Y" textbox—allows you to set the offset, in pixels from the upper left corner of the bitmap, where the label will be placed. A text offset of X:4 and Y:10, for example, will begin the label at 4 pixels to the right and ten pixels below the upper left corner of the bitmap.
- "Label suffix" textbox—text entered into this edit box will be appended to the displayed value. For example, if the label suffix is "hours" and the value of the object is 4, the label will read "4 hours."

Edit Ranges/Values



1. Click on the <undefined value> line.
2. Click on the ... icon to choose the default bitmap to be displayed.
3. For each value or range of values you wish to be represented by a different bitmap, click on the ADD NEW button.
4. Enter the value or range in the appropriate edit boxes, then click on the ... icon to set the bitmap for that range.

Dial Control Properties



Styles:

- "Display graph" checkbox—if selected, will enable the display of a histogram graph below the dial display.

Arithmetic expression:

- Set Expression button—displays the Choose Expression dialog. See "Setting an Expression" on page 375.

Conclusion

The complexities involved in the design and building of custom forms are considerable, but are more than compensated for by the great amount of control that custom forms give to both the display of SNMP information and the control of SNMP devices.

By careful form design, it is possible not only to make data more useful to experienced Observer users, but also to make it possible for users with little technical knowledge to interact effectively with SNMP devices.

The MIB Walker

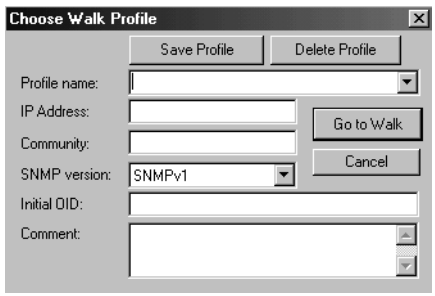
Overview

In attempting to configure or reconfigure an SNMP device, it's often useful to be able to see what OID values the SNMP device has and to explore the implementation of both standard MIBs and the SNMP device's proprietary MIBs.

> This is particularly useful when a device uses proprietary OIDs for which there is no published MIB file or when a published MIB file has an error in it. By rewriting (and then recompiling) a MIB file to reflect the actual configuration, you can have more control over the device, even if it is nonstandard.

The tool that is used to explore the MIB objects and values on a device in SNMP Management Console is the MIB Walker.

Choose Walk Profile

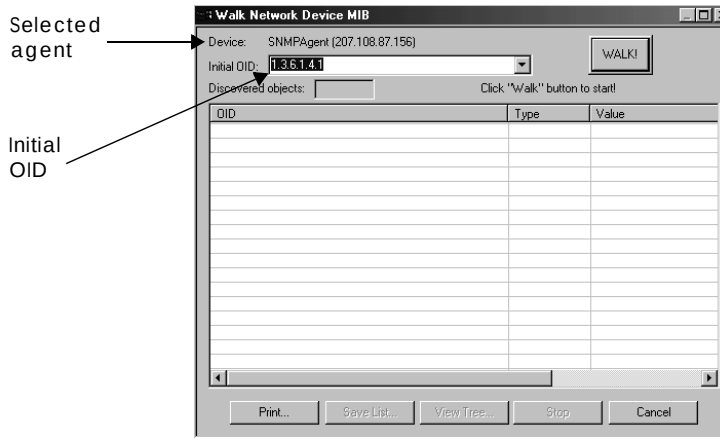


- "Profile name" textbox—allows you to enter the profile name.
- "IP Address" textbox—allows you to enter the IP address.
- "Community" textbox—allows you to enter the community name.
- "SNMP version" dropdown—allows you to select the SNMP version.
- "Initial OID" textbox—allows you to enter the initial OID.
- "Comment" textbox—allows you to enter comments about the walk profile.

SNMP MIB Walker

The MIB Walker is accessed by selecting an SNMP device from the SNMP Agents pane and clicking Tools > SNMP MIB Walker.

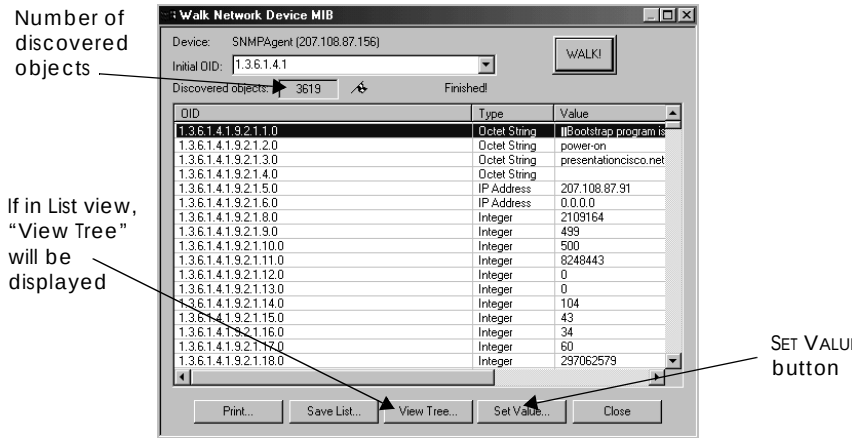
1. To walk an agent MIB, right-click on the desired SNMP Agent in the SNMP Agent pane and select WALK NETWORK DEVICE MIB.



2. By default, the initial OID for the walk will be 1.3.6.1.4.1. If you prefer to have your MIB walk begin from another OID, enter it in the “Initial OID” textbox or use the dropdown arrow if you’ve recently used another starting point. Note that 1.3.6.1.4.1 is the “root” of the proprietary part of the MIB tree. A walk from 1.3.6.1.4.1 will give you information on the proprietary OIDs. To get information from the standard OIDs, start the walk at 1.3.6.1.2.1.

3. Click the WALK! button to start.

4. SNMP Management Console's MIB Walker will step through all higher branches of the MIB tree (starting at the initial OID) and display the results in the **Walk Network Device MIB Table Viewer**.

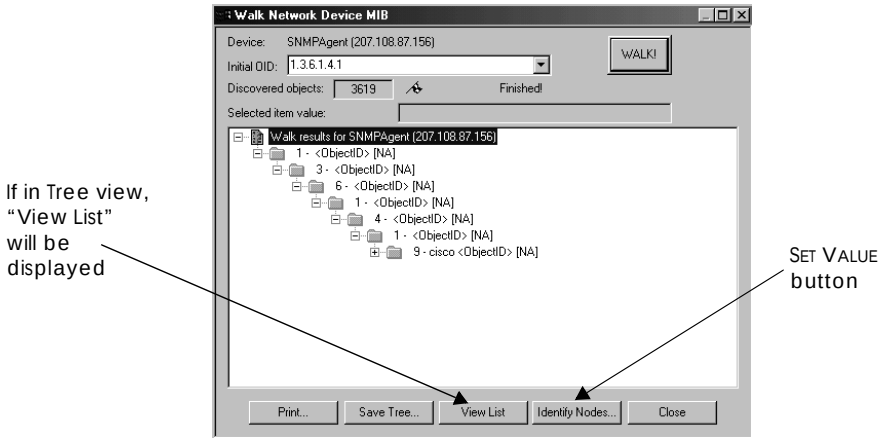


The following buttons are active from the **Walk Agent MIB Table Viewer** after the walk has been completed:

- Print button—allows you to send the table to a user-chosen printer.
- Save List button—allows you to save the table to a user-chosen file.
- View Tree or View List button—allows you to switch between Tree View and List View. See "View MIB Tree" on page 387.
- Identify Nodes button—allows you to identify the walked nodes using a user-chosen MIB file.
- Close button—allows you to close the Walk Agent MIB Tree Viewer.

View MIB Tree

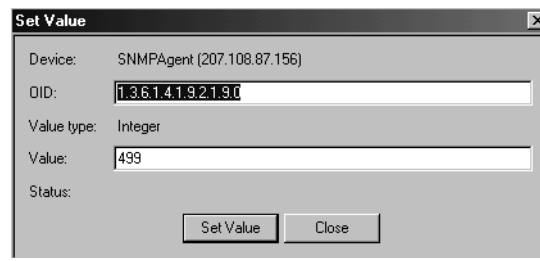
Selecting the VIEW TREE button from the **Walk Agent MIB** dialog displays the **Walk Agent MIB Tree Viewer**. The Walk Agent MIB Tree Viewer displays the structure, although not the values, of the discovered MIB tree.



Setting Values

One of the main uses of the MIB Walker and the Walk Agent List Viewer is to permit you to explore the SNMP agent by setting values to see what effect different values have on the actual device and to be sure that objects are writable.

1. To set a value, select any object on the Walk Agent List Viewer and click on the SET VALUE button. The **Set Value** dialog will be displayed.



Before attempting to make any changes, note the present value, so that you can restore the device to its original state.

2. Enter an appropriate real or test value into the Value textbox.
3. Click the SET VALUE button. SNMP Extension will attempt to set the given OID to the entered value.
4. If the attempt to set the value succeeds, the dialog box will be redisplayed with the Status line reading "Done."

Be careful to use the proper type of value when setting the value. If you attempt to set an integer SNMP value to a character string (e.g., "Bob") it will be set to zero.

5. If the attempt to set the value fails, an error dialog will be displayed, and the Status line on the **Set Value** dialog box will read “Failed” instead of “Done.”

   Failure can happen for one or both of two reasons:

   - the MIB object you are attempting to set is read-only and cannot be reset, and/or
   - you do not have the proper read-write community name for this device.

SNMP Technical Overview

History

Simple Network Management Protocol (SNMP) was proposed in 1988 as a set of Requests for Comments (RFCs) defining the basic principles and implementation for a protocol that would establish a standard for Internet monitoring and management, as a replacement for the myriad of vendor-specific network management solutions available at the time.

Since then, SNMP has gained considerable popularity. Although it hasn’t replaced all proprietary solutions, it has become a widely accepted standard for network management. Subsequent RFCs for SNMP have corrected problems and supplemented the original standard Management Information Base (MIB).

The standard MIB, defined by RFC1213, defines numerous objects in ten groups—system, interfaces, address translation, IP, ICMP, TCP, UDP, EGP, transmission, and SNMP.

However, manufacturers are constantly adding capabilities to their products, and some of them are not covered by the standard objects and groups. To bring the benefits of SNMP monitoring and control to additional features, software and hardware vendors have developed proprietary MIBs.

Most major computer hardware manufacturers now offer lines of networking products that support SNMP, including network cards, hubs, bridges, routers, switches, and printers. Because adding an SNMP agent to network hardware often increases the price of the product, manufacturers usually offer versions with and without SNMP support.

Most operating systems, including UNIX and Microsoft Windows systems, implement SNMP agents in their architecture.

In early 1990, the original SNMP specifications were revised and updated. New MIB groups were added and some old MIB objects became obsolete. In general, the new MIB specification, called MIB II (or MIB-2) is compatible with the original MIB, now called MIB I.

By the end of 1991, the standard SNMP MIB specification was extended by the Remote Network Monitoring MIB (RMON). RMON provides a set of SNMP objects related to network analysis and monitoring. Information provided by RMON is somewhat different in scope from the typical SNMP information provided by network devices. Usually, a device collects information about the device itself, in connection to either operation of the device or its relationship to the network. The RMON agent, on the other hand, attempts to collect information about network traffic to and from other devices on the network (aside from the agent device), including network statistics, history, information about hosts on the network, connections, and events. An RMON agent can set filters and capture traffic to and from specific devices on the network.

Security concerns related to SNMP prompted development of a secure SNMP called S-SNMP, and the first S-SNMP RFCs appeared in mid-1992. S-SNMP adds security enhancements to the original SNMP protocol but does not offer any additional functionality. S-SNMP is not compatible with the original SNMP.

About the same time, a considerable design effort focused on enhancing the SNMP protocol, incorporating the security features provided by S-SNMP and adding new MIB functionality. The result of this effort is SNMP Version 2, or SNMPv2.

SMNPv2 was not received enthusiastically by many software and hardware vendors. Many had devoted considerable effort to the development of SNMP MIB I and MIB II agents, and in many cases security was not important for users. Most agents currently provided by vendors are SNMP MIB II, not SNMPv2.

SNMP MIB II with proprietary functionality is currently the defacto standard among SNMP users. This overview addresses the general principles of SNMP without addressing the details of SNMPv2.

General Principles

SNMP is designed around the concept of a relationship between a management station and managed agents.

A management station is the location where a network administrator can view, analyze, and even manage local network devices. A management station can be a dedicated computer or workstation, or software running on a general-purpose workstation—like a personal computer running SNMP Extension on Windows 2000/XP.

An SNMP agent is a program that runs on the managed device. It collects information about device operation. For example, if the object is a TCP/IP router, the agent can collect information about network traffic passing through the router and information about the behavior of the router itself under different load conditions.

The SNMP agent maintains a database called the Management Information Base (MIB). The agent uses the MIB to track and systematically update data. Information in a MIB is organized in a tree structure. Each piece of data can be considered a leaf on various branches of the tree. Individual pieces of data are called data objects.

When the management station needs information from an SNMP agent, it sends an SNMP request. SNMP specifications allow the station to ask for more than one MIB object in a single request.

When the SNMP agent receives the request, it searches its local MIB, finds the current values of the requested data, forms a response packet (PDU), and sends the PDU back to the management station.

The management station receives the PDU, decodes it from the SNMP PDU format, and displays the information as a list or in a graphical format that allows the network manager to view, analyze, and modify the information.

The following sections review the concepts above in more detail.

SNMP MIB Objects, Groups, and Addresses

A MIB is a set of SNMP objects organized in a tree address structure. Each object in a MIB has a unique address called an object identifier, and each branch on the tree is identified by a number. The ISO 8824 specification defines the lower branches of the SNMP MIB tree as:

iso(1).org(3).dod(6).internet(1) or, as expressed in Structure of Management Information (SMI) language, 1.3.6.1 (see illustration).

The SNMP tree resides under the Internet subtree. Four branches after the Internet subtree can be used by SNMP: The directory(1) subtree is reserved for future use by OSI.

- The mgmt(2) subtree includes standard SNMP MIBs I or II (RFC1156 and RFC1213).
- The experimental(3) subtree is reserved for Internet experiments.
- The private(4) subtree provides space for vendor-specific MIBs. All private MIBs are located under enterprises(1) branch. Any private object ID (OID) should begin from the base address 1.3.6.1.4.1.

The address 1.3.6.1.2.1 or iso.org.dod.internet.mgmt.mib represents the address of the standard SNMP MIB I or II on the ISO tree. Inside the MIB branch, SNMP objects are organized beneath higher level branches called MIB groups. Because of the large number of objects—the standard MIB II includes almost two hundred—MIB groups have been created to simplify addressing. Groups consist of related objects: for example, ICMP, TCP, EGP, and other statistics object groups.

The object address is the path from the MIB's root to an object. For example, the object sysDescr in the MIB(1) System Group has the address 1.3.6.1.2.1.1.1 (see illustration).

Types of SNMP MIB Objects

SNMP objects accommodate many different types of data in the tree structure, including numbers, text, addresses, bitfield assigned descriptions, and object IDs. Two

specifications are used to describe the MIB objects: Abstract Syntax Notation One (ASN.1) and Basic Encoding Rules (BER).

Abstract Syntax Notation One (ASN.1)

ASN.1 describes objects in textual MIB descriptions. It describes rules for writing consistent MIBs that compile without errors, both standard and proprietary. ASN.1 includes basic types such as INTEGER, OCTET STRING, OBJECT, NULL, and SEQUENCE. For example, the following is a sample of the ASN.1 object sysDescr from the MIB II System Group:

```
-—the System group
sysDescr OBJECT-TYPE
SYNTAX OCTET STRING
ACCESS read-only
STATUS mandatory
DESCRIPTION

"A textual description of the entity. This value should include the full name and
version identification of the system's hardware type, software operating-system
[sic], and networking software. It is mandatory that this only contain printable
ASCII characters."

    ::= { system 1 }
```

The sample above shows the singular SNMP object. More precisely, the singular object is expressed as an OID appended by the 0 address (OID.0). For example, the object sysDescr in the MIB(1) System Group can be expressed as 1.3.6.1.2.1.1.1.0, signifying that the object has only one instance. The SNMP Extension OID notation always uses the ".0" extension for singular objects, to distinguish more clearly between singular and columnar objects.

In addition to singular objects, ASN.1 also describes the columnar objects: tables or sequences of objects. A singular SNMP object represents only one value. In the situations where many data entries exist for a similar type (e.g., the IP routing table), it can be difficult or impossible to combine these values as singular values (particularly when the number of the entries is variable). In these situations, data is better represented by list-like structures or sequences called tables. Each line in a table represents one expression of the set of objects included in the table. A good example of this is the IP Address Table from the MIB II:

```
ipAddrTable OBJECT-TYPE
SYNTAX SEQUENCE OF IpAddrEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
"The table of addressing information
relevant to this entity's IP addresses."
::= { ip 20 }
```

```
ipAddrEntry OBJECT-TYPE
SYNTAX IpAddrEntry
ACCESS not-accessible
STATUS mandatory
DESCRIPTION
“The addressing information for one of
this entity's IP addresses.”
INDEX { ipAdEntAddr }
::= { ipAddrTable 1 }
IpAddrEntry ::=
SEQUENCE {
ipAdEntAddr
IpAddress,
ipAdEntIfIndex
INTEGER,
ipAdEntNetMask
IpAddress,
ipAdEntBcastAddr
INTEGER
}
```

Basic Encoding Rules (BER)

BER describes how to convert the values of MIB objects into a format that allows them to be transferred through a network. The BER specification provides a way to express all ASN.1 objects in binary format. BER rules are used for object types, object values, and object IDs. The usual format of a BER-encoded value includes the type field (1 byte), variable length, and data fields. The consistent format allows multiple objects to be placed in a single PDU on the transmitting side and decoded on the receiving side.

SNMP Requests

SNMP works by exchanging SNMP requests between a management station and an SNMP agent. Requests are usually transferred as a data portion of an IP-UDP packet, although implementations of SNMP exist for TCP, IPX-SPX, and other protocols. For UDP, the SNMP management station sends requests to the agent over the network to UDP port number 161. The SNMP message consists of two parts:

- The SNMP header, including SNMP version number, request size information, and a password (called a community name).
- The block of one or more requested objects combined in the PDU.

There are five different PDU types: GetRequest, GetNextRequest, GetResponse, SetRequest, and Trap. The first four PDUs have the same format. (The Trap PDU has a somewhat different format and has a different scope of use). The first three fields of the first four PDUs identify PDU type, PDU size, and error information. These common fields are followed by a variable bindings field that includes one or more request or reply objects.

The GetRequest PDU is used by the management station to retrieve the values of one or more objects from an agent. These values are usually singular, not columnar. When an agent receives a GetRequest PDU, it checks the PDU for errors, finds the values corresponding to the request packets, and sends a GetResponse PDU back to the management station. If the error in the request packet occurs, the GetResponse PDU returns an error message instead of the requested data. Errors can occur for the following reasons:

- The variable bindings field does not exactly match the available object. In this case, the GetResponse PDU returns a “noSuchName” error message.
- The variable is an aggregate type, such as a table object, in which case the return message is “noSuchName.”
- The size of the GetResponse PDU would exceed the local protocol stack limitations. In this case, the error message “tooBig” is returned.

The management station uses the GetNextRequest PDU to retrieve one or more objects and their values from an agent. Usually these objects are multiple objects residing inside a table. To retrieve all lines of the table, the management station starts at the beginning of a table and sends GetNextRequest PDUs until all entries in the table are read. If no error occurs, the agent returns the GetResponse PDUs on each of the GetNextRequest PDUs.

The SetRequest PDU is used by the management station to modify the value of an object on the SNMP agent. If no error occurs, the agent sets a new value for the specified object and returns a GetResponse PDU as a confirmation of the successful operation.

Agents send SNMP traps to the management station as notification regarding predefined events. The trap PDU has a different format than the other four SNMP messages. On UDP, traps are sent to port 160 on the management station. Because trap messages can be sent from many different agents, the header of the trap PDU includes an enterprise OID and agent address followed by the generic and specific trap types, timestamp, and the variable bindings field.

There are seven generic trap types:

- “coldStart”—the SNMP agent device is reinitializing in a way that allows the device or agent to be reconfigured.
- “warmStart”—the SNMP agent device is reinitializing in the way that does not allow the device or agent to be reconfigured.
- “linkDown”—the SNMP agent detected a failure in the connection link.
- “linkUp”—the connection link came up.
- “authenticationFailure”—the SNMP management station did not properly authenticate with the agent.
- “egpNeighborLoss”—an EGP peer of the SNMP agent is down.

- “enterpriseSpecific” trap—the SNMP agent is notifying the management station about an event defined by the vendor for the device. The specific trap type provides more information.

RFCs

The SNMP specification and related matters are defined in the following RFCs:

RFC1089—SNMP over Ethernet

RFC1140—IAB Official Protocol Standards

RFC1147—Tools for Monitoring and Debugging TCP/IP

Internets and Interconnected Devices

RFC1155—Structure and Identification of Management [superseded by RFC1470]

Information for TCP/IP-Based Internets

RFC1156 (H)—Management Information Base Network

Management of TCP/IP-Based Internets

RFC1157—A Simple Network Management Protocol

RFC1158—Management Information Base Network

Management of TCP/IP-Based Internets: MIB-II

RFC1161 (H)—SNMP over OSI

RFC1187—Bulk Table Retrieval with the SNMP

RFC1212—Concise MIB Definitions

RFC1213—Management Information Base for Network Management of TCP/IP-based Internets: MIB-II

RFC1215 (I)—A Convention for Defining Traps for use with the SNMP

RFC1224—Techniques for Managing Asynchronously-Generated Alerts

RFC1270 (I)—SNMP Communication Services

RFC1303 (I)—A Convention for Describing SNMP-based Agents

RFC1470 (I)—A Network Management Tool Catalog

RFC1298—SNMP over IPX

RFC1418—SNMP over OSI

RFC1419—SNMP over IPX

Observer Suite: Web Reporting

Web Publishing Service is a part of Network Instruments' Observer Suite, bringing Observer's reporting ability to any computer with a standard Web browser.

Introduction to Web Publishing Service

The Observer Suite's Web Publishing Service allows an administrator, end-user, or consultant to view network trending data monitored by Observer from any Web browser. Web Publishing Service works in conjunction with Observer and Observer's built-in Web server, permitting you to selectively make trending information available either to anybody with a Web browser and TCP/IP connectivity to the Observer PC, or to those who have been provided with a password.

With the Observer Suite's Web Publishing Service you can:

- Publish network "Weather Reports" for your corporate intranet/extranet.
- Provide non-Observer users controlled access to network or WAN baseline data.
- Access current or historical statistics from any browser, anywhere.
- See real-time statistics with granularity down to one minute.
- Provide security levels with administrator-definable access for multiple levels of protection.
- Give in-house administrators control over access to sensitive data by outside network consultants and technicians.

Overview

Observer's Web Publishing Service adds to the functionality of Observer and expands the availability of Observer statistics to any platform that supports a Web browser. Network trending information (and SNMP trending information, if you have SNMP Management Console), is collected by Observer and reports are dynamically generated on a request-by-request basis from any browser. Reports can be configured to display data based on time, station(s), or both. Options include a single day's data, a range of days, weeks, months, or even longer. Additionally, reporting can be based on specific stations or servers to get current or historical usage and usage trends.

Web reporting can be password-protected and content-defined so access to network trending information is completely controlled by the local administrator. This ability

allows an administrator to not only define which reports and statistics should be published for outside viewing, but also allows the setting of an access password to define who can access the data.

For example, this flexible security system would allow a local administrator to let an outside consultant have the ability to view data flow and packet error information without providing packet capture and decode abilities; thus, protecting any sensitive company data such as passwords, user names, and accounting information. Another application might be to let internal network users check for themselves the current network or server utilization prior to making a call to the help desk with a slow response complaint.

Statistics Available

All statistics are available for single stations or the entire network. Time periods can be defined to show a single time frame (e.g., minutes, days, weeks) or compare two time frames. Drill-down is also available for all aggregate displays to find specific station information for the selected time frame. All statistics are available for Ethernet, Token Ring, and FDDI, and for every segment tracked by a Probe.

When supplemented with a Probe, Observer can be configured to automatically “harvest” Probe segment data back to the Observer Web console at administrator- definable time intervals, making Probe segment data available for your entire network or WAN.

Combining the power of Observer and the accessibility of the World Wide Web, Observer Web Publishing Service is an ideal addition to any Observer implementation.

Configuring Web Publishing Service

Web Publishing Service has two configuration options. The user may:

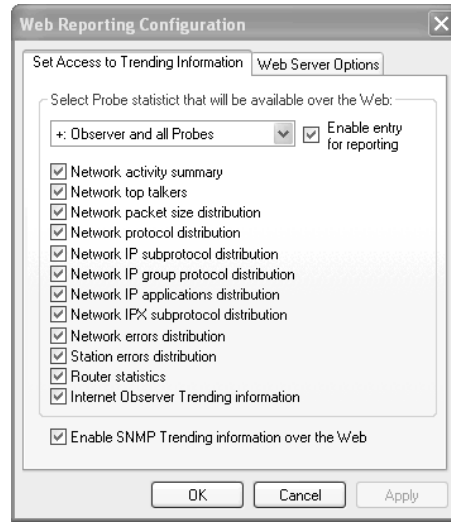
- configure which statistics will be available to browsers on a Probe by Probe basis or for all Probes, and/or
- configure password access to view the configured statistics.

Both items are configured in the Web configuration dialog within the Observer console by selecting Options > Web Reporting Configuration from the main Observer Menu.

Web Reporting Configuration

Set Access to Trending Information Tab

The Set Access to Trending Information tab lets you specify which statistics will be available for viewing and whether or not SNMP trending information will be available over the Web.



The statistics list can be maintained on a Probe-by-Probe basis or for all Probes.

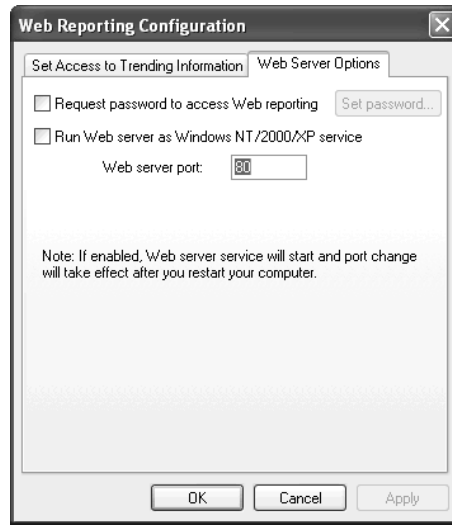
- Precedence is based on the last value set. For example, if “Network activity summary” is enabled for “Observer and all Probes,” and then disabled for “Probe001,” Network activity summary information will be available for all Probes (including the local, built-in Probe that is part of Observer) except for Probe001.
- If permissions are enabled for all Probes, the box for “Observer and all Probes” will be checked against a white background.
- If permissions are disabled for all Probes, the box for “Observer and all Probes” will be cleared.
- If permissions are enabled for some Probes, but not for others, the checkbox for “Observer and all Probes” will be checked against a gray background.

The following options are available:

- “Network activity summary” checkbox—if selected, displays who is on the network and first seen/last seen access times.
- “Network top talkers” checkbox—if selected, identifies the top users of network bandwidth. Shows all stations or top XX talkers.
- “Network packet size distribution” checkbox—if selected, displays packets sizes.
- “Network protocol distribution” checkbox—if selected, displays the major protocol usage.

- “Network IP subprotocol distribution” checkbox—if selected, displays the major IP subprotocol distribution (e.g., TCP, UDP, ICMP, ARP, RARP, IP).
- “Network IP group protocol distribution” checkbox—if selected, displays the major Network IP subprotocol distribution.
- “Network IP applications distribution” checkbox—if selected, displays the IP applications distribution (e.g., Telnet, POP, HTTP). User-defined applications can be added.
- “Network IPX subprotocol distribution” checkbox—if selected, displays major IPX protocol distribution.
- “Network errors distribution” checkbox—if selected, displays total network errors distribution.
- “Station activity summary” checkbox—if selected, displays network activity broken down by station.
- “Station errors distribution” checkbox—if selected, displays network errors displayed by station.
- “Router statistics” checkbox—if selected, displays your router’s throughput over time.
- “Internet Observer Trending Information” checkbox—if selected, determines whether or not Internet Observer Trending information will be made available via Web Extension.
- “Enable SNMP Trending information over the Web” checkbox—if selected, determines whether or not SNMP Trending information will be made available via Web Extension.

Web Server Options Tab


Web Reporting Configuration
Set Access to Trending Information
Web Server Options
Request password to access Web reporting
Set password...
Run Web server as Windows NT/2000/XP service
Web server port:
80
Note: If enabled, Web server service will start and port change will take effect after you restart your computer.
OK
Cancel
Apply

The Web Server Options tab contains the following items:

- "Request password to access Web reporting" checkbox—if selected, allows you to set a password for accessing the Web Publishing Service facility. If password protection is on, each user will have to enter a password to gain access to the reporting facility.

  If the Web Publishing Service has not been configured to require a password, all of the trending data enabled during Web Publishing Service configuration will be available to anyone with TCP/IP connectivity to the Observer PC.

- Set password button—only active if the "Request Password to access Web reporting" checkbox is selected. Clicking on the Set Password button displays the Set Web Access Password dialog.

- "Run Web server as Windows 2000/XP service" checkbox—if Web Extension has been installed on a copy of Observer running under Windows 2000/XP, checking this box will make the Web server a Windows service, causing it to run whenever the Observer PC is started.

  Changes to the Web server's status as a service will take place the next time that the Observer PC is rebooted.

- “Web server port” textbox—this textbox sets the port that will be used for accessing the Web server.

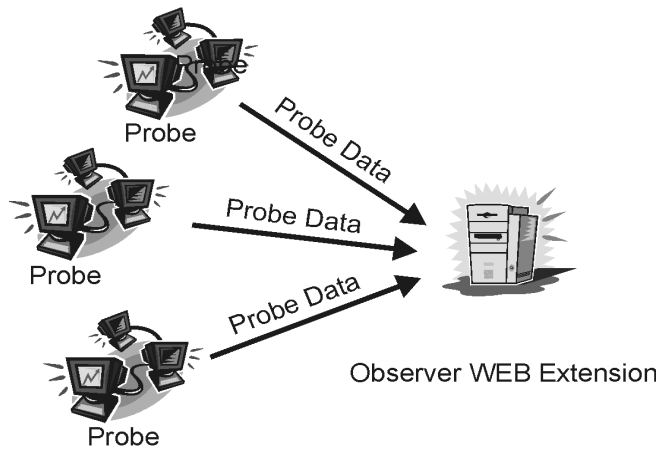
  Changes to the Web server port will take effect the next time that the Observer PC is rebooted.

Using Web Publishing Service

To receive maximum benefit from the Web Publishing Service, it is recommended that you run Observer’s Trending mode at all times to collect a complete view of your network/WAN’s data flow patterns.

Once you have collected trending data at the local Observer (or at the console for Distributed Observer), you can view the data using Web Publishing.

For data collected at a Probe site, Observer offers the ability to “harvest” data from remote Probes at configurable time frames. Please see the “Using Probe” (Probe Setup) section of the Probe manual for more information on configurable Probe data transfers.



To view Web Publishing data from any Web browser, enter the following URL in your Web browser:

http://[Observer PC]/Observer/WebExt.htm

substituting either the IP address (e.g., “192.168.0.3”) or DNS name (e.g., “jim.impossico.com”) for [Observer PC].

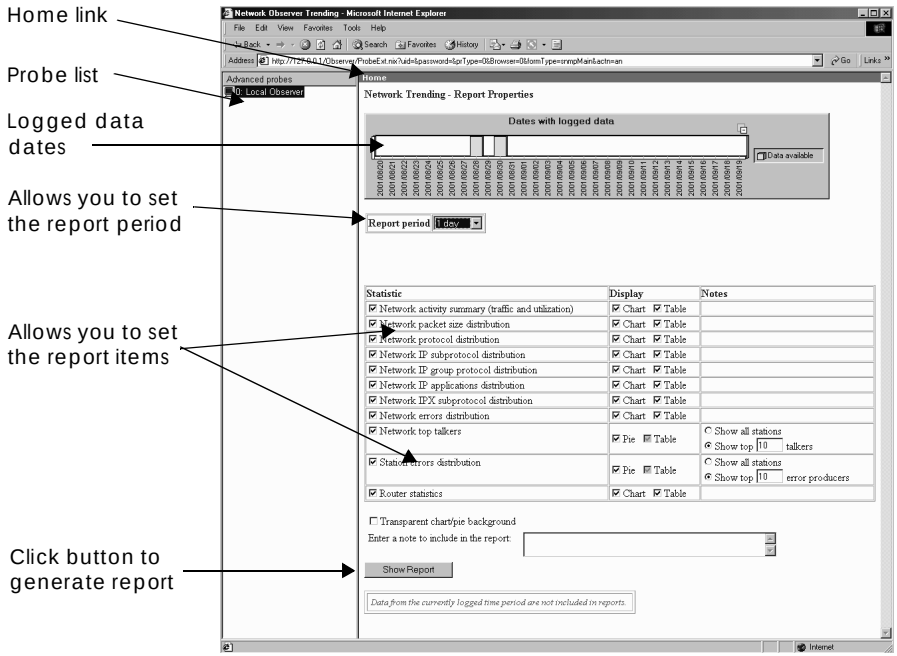
The Web Publishing Service Welcome page will be displayed.

Whether or not you have configured Web Publishing Service to require a password, the **Web Publishing Service Welcome** page will be displayed. If you have configured Web Publishing Service to require a password, the correct password must be entered in order to access Web Publishing Service data. If Web Publishing Service has not been configured to require a password, any or no password will work.

Click on the type of trending you wish to view. You can select from: Network Trending, Switch Trending, Internet Trending, or SNMP Trending.

Network Trending

Allows you to view Network Trending historical data.



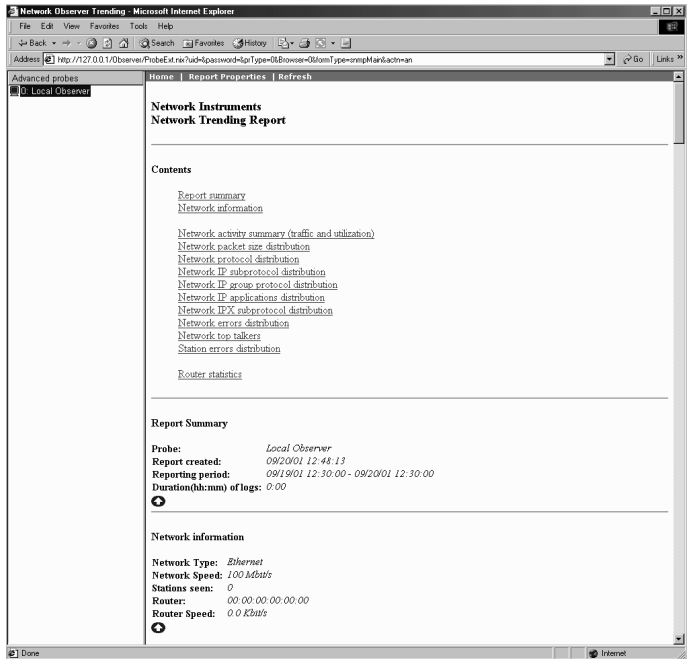
- Probe list—lists the Probes (including the built-in, local Probe that is part of Observer) for which trending data has been collected.
- "Dates with logged data" chart—displays the dates logged data is available for.
- "Report period" combo box—allows you to select the report period time. You can select either: 1 day, 1 week, 2 weeks, 1 month, or custom.

Statistic, Display, and Notes:

- "Network activity summary (traffic and utilization)" checkbox—if selected, the report will capture a summary of network activity. You can select the data to be displayed as a chart and/or a table.
- "Network packet size distribution" checkbox—if selected, the report will capture network packet size distribution. You can select the data to be displayed as a chart and/or a table.
- "Network protocol distribution" checkbox—if selected, the report will capture network protocol distribution. You can select the data to be displayed as a chart and/or a table.
- "Network IP subprotocol distribution" checkbox—if selected, the report will capture network IP subprotocol distribution. You can select the data to be displayed as a chart and/or a table.

- “Network IP group protocol distribution” checkbox—if selected, the report will capture network IP group protocol distribution. You can select the data to be displayed as a chart and/or a table.
- “Network IP applications distribution” checkbox—if selected, the report will capture network IP applications distribution. You can select the data to be displayed as a chart and/or a table.
- “Network IPX subprotocol distribution” checkbox—if selected, the report will capture network IPX subprotocol distribution. You can select the data to be displayed as a chart and/or a table.
- “Network errors distribution” checkbox—if selected, the report will capture network errors distribution. You can select the data to be displayed as a chart and/or a table.
- “Network top talkers” checkbox—if selected, the report will capture top talkers. You can select the data to be displayed as a chart and/or a table. You may also select to show all stations on the network or you may limit the number to a user-specified number of top talkers.
- “Station errors distribution” checkbox—if selected, the report will capture station errors distribution. You can select the data to be displayed as a chart and/or a table. You may also select to show all stations on the network or you may limit the number to a user-specified number of error procedures.
- “Router statistics” checkbox—if selected, the report will capture router statistics. You can select the data to be displayed as a chart and/or a table.
- “Transparent chart/pie background” checkbox—if selected, the report chart (if defined) will have a transparent background.
- “Enter a note to include in the report” textbox—allows you to enter a note for inclusion in the report.

- Show Report button—generates the report and displays the Trending Report page.



The report has two parts:

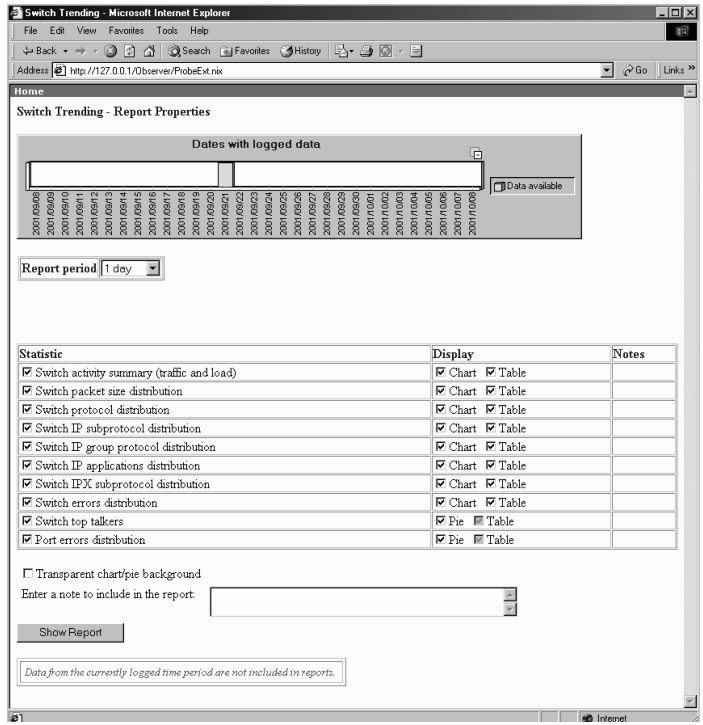
- Contents Section—contains a table of contents of the report, as configured by using the Statistic checkboxes on the Report Properties page. Each line in the contents section represents one report item. Each line in the contents section is also a hotlink to the named item; clicking on it will bring you directly to the item it represents.
- Report items—contains the actual report items, as configured by using the Statistics checkboxes on the Report Properties page. Each section also contains an icon, which is linked to the contents section.

Reports can contain two types of items: charts and tables. Charts are graphic displays of the selected information, while tables are numerical or text representations. Most items can be displayed as either or both.

Switch Trending

Allows you to view Switch Trending data.

Click the INTERNET TRENDING button on the **Web Publishing Service Welcome** page to display the **Internet Trending Report Properties** page.


Switch Trending - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://127.0.0.1/Observer/ProbeExt.nix
Go Links
Home
Switch Trending - Report Properties
Dates with logged data
Data available
Report period 1 day
Statistic
Display
Notes
Switch activity summary (traffic and load) Chart Table
Switch packet size distribution Chart Table
Switch protocol distribution Chart Table
Switch IP subprotocol distribution Chart Table
Switch IP group protocol distribution Chart Table
Switch IP applications distribution Chart Table
Switch IPX subprotocol distribution Chart Table
Switch errors distribution Chart Table
Switch top talkers Pie Table
Port errors distribution Pie Table
Transparent chart/pie background
Enter a note to include in the report:
Show Report
Data from the currently logged time period are not included in reports.
Internet

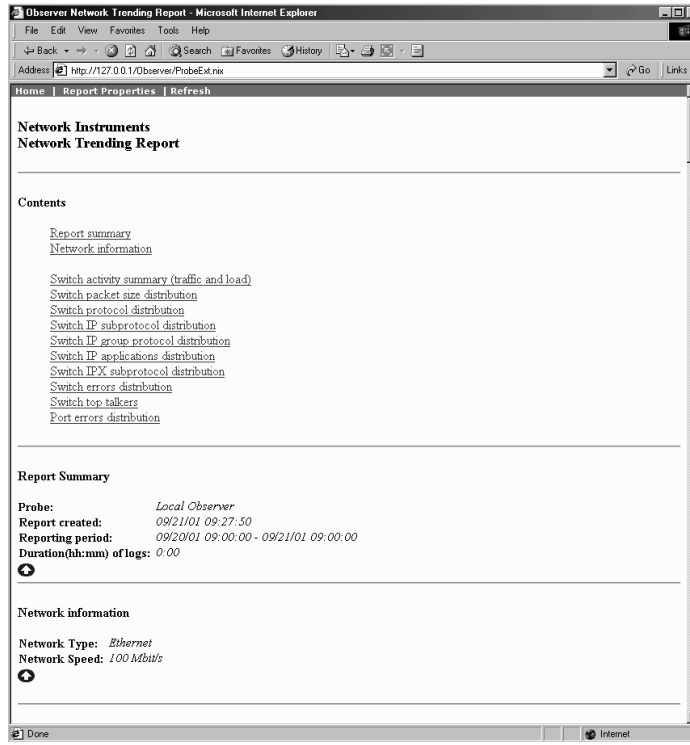
- "Dates with logged data" chart—displays the dates logged data is available for.
- "Report period" combo box—allows you to select the report period time. You can select either: 1 day, 1 week, 2 weeks, 1 month, or custom.

Statistic, Display, and Notes:

- "Switch activity summary (traffic and load)" checkbox—if selected, the report will capture a summary of switch activity. You can select the data to be displayed as a chart and/or a table.
- "Switch packet size distribution" checkbox—if selected, the report will capture switch packet size distribution. You can select the data to be displayed as a chart and/or a table.
- "Switch protocol distribution" checkbox—if selected, the report will capture switch protocol distribution. You can select the data to be displayed as a chart and/or a table.
- "Switch IP subprotocol distribution" checkbox—if selected, the report will capture switch IP subprotocol distribution. You can select the data to be displayed as a chart and/or a table.

- “Switch IP group protocol distribution” checkbox—if selected, the report will capture switch IP group protocol distribution. You can select the data to be displayed as a chart and/or a table.
- “Switch IP applications distribution” checkbox—if selected, the report will capture switch IP applications distribution. You can select the data to be displayed as a chart and/or a table.
- “Switch IPX subprotocol distribution” checkbox—if selected, the report will capture switch IPX subprotocol distribution. You can select the data to be displayed as a chart and/or a table.
- “Switch errors distribution” checkbox—if selected, the report will capture network errors distribution. You can select the data to be displayed as a chart and/or a table.
- “Switch top talkers” checkbox—if selected, the report will capture top talkers. Data is displayed as a pie chart only.
- “Port errors distribution” checkbox—if selected, the report will capture port error distribution. Data is displayed as a pie chart.
- “Transparent chart/pie background” checkbox—if selected, the report chart (if defined) will have a transparent background.
- “Enter a note to include in the report” textbox—allows you to enter a note for inclusion in the report.

- Show Report button—generates the report and displays the Trending Report page.



The Switch report is similar to the Network report, with the significant difference in that it displays trending information for the specific switch, rather than the network as a whole. Top Talkers, for example, will display the information for the top talkers on the switch, rather than the monitored network segment.

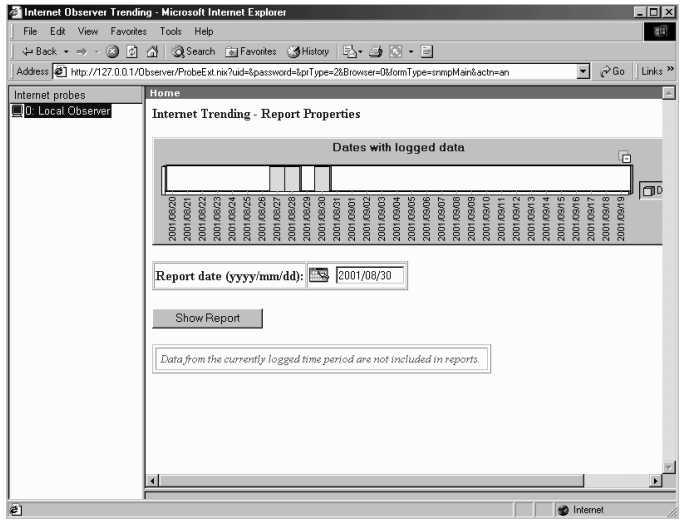
The report has two parts:

- Contents Section—contains a table of contents of the report, as configured by using the Switch Trending Report Properties page. Each line in the contents section represents one report item. Each line in the contents section is also a hotlink to the named item; clicking on it will bring you directly to the item it represents.
- Report Items—contains the actual report items, as configured by using the Switch Trending Report Properties page. Each section also contains an icon that is hotlinked to the contents section.

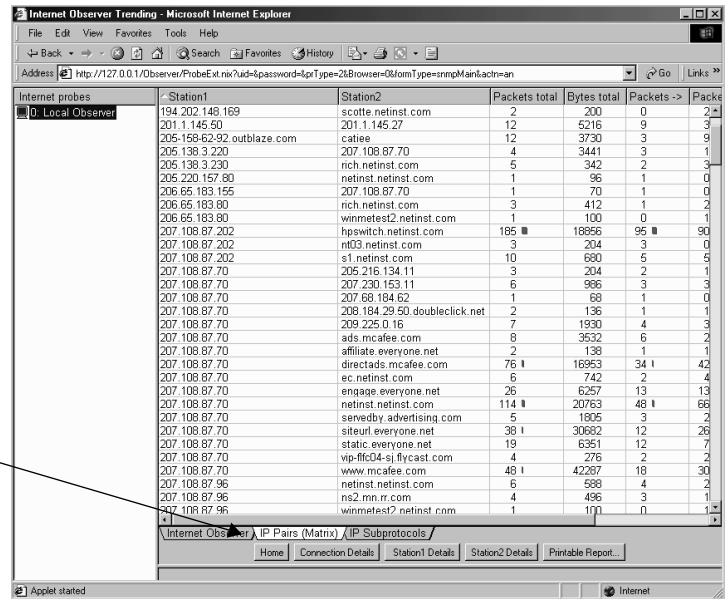
Internet Trending

Allows you to view Internet Observer trending data.

Click the INTERNET TRENDING button on the **Web Publishing Service Welcome** page to display the **Internet Trending Report Properties** page.



A listing of days for which Internet trending data is available will be displayed in the date selection pane. Select the day you wish to see a report for and click on the SHOW REPORT button to display the **Internet Trending Report** page.



Bottom pane tabs

The bottom pane of the report contains three tabs, permitting three different views of Internet trending information for the selected time period:

Internet Observer

- Station (by MAC)—the MAC address of the first station in the conversation.
- Talking to (by IP)—the IP address of the second station in the conversation.
- Packets Total—total packets sent between the two stations.
- Bytes Total—total bytes sent between the two stations.
- Packets ->—packets sent from the first station to the second station.
- Packets <-—packets sent to the first station from the second station.
- Bytes ->—bytes sent from the first station to the second station.
- Bytes<-—bytes sent to the first station from the second station.

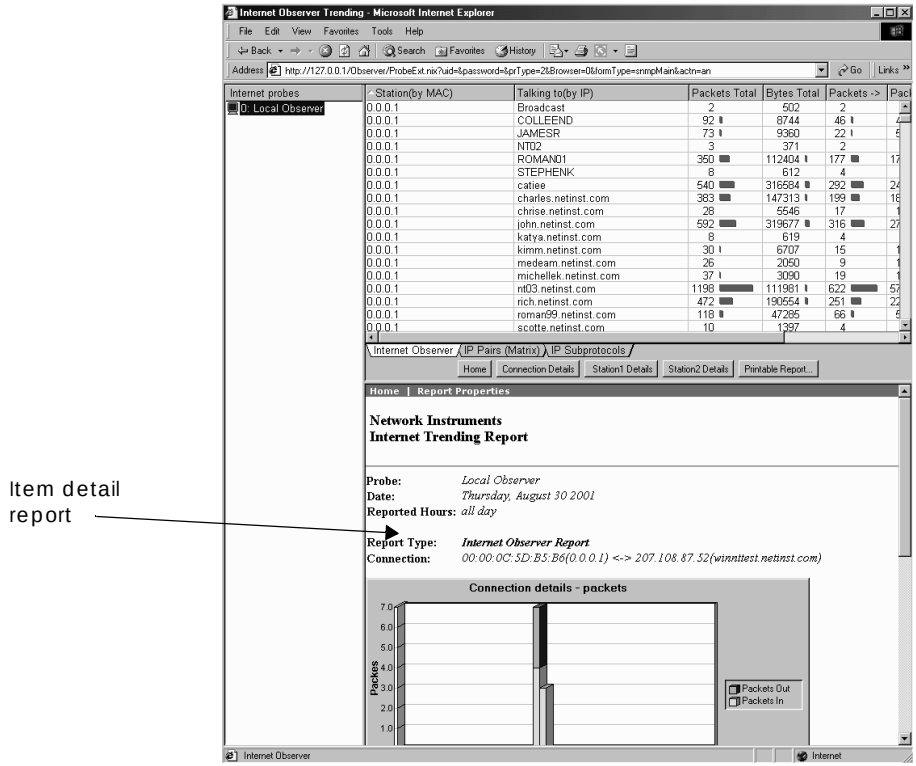
IP Pairs (Matrix)

- Station 1—the IP address of the first station in the conversation.
- Station 2—the IP address of the second station in the conversation.
- Packets total—total packets sent between the two stations.
- Bytes total—total bytes sent between the two stations.
- Packets ->—packets sent from the first station to the second station.
- Packets <-—packets sent to the first station from the second station.
- Bytes ->—bytes sent from the first station to the second station.
- Bytes<-—bytes sent to the first station from the second station.

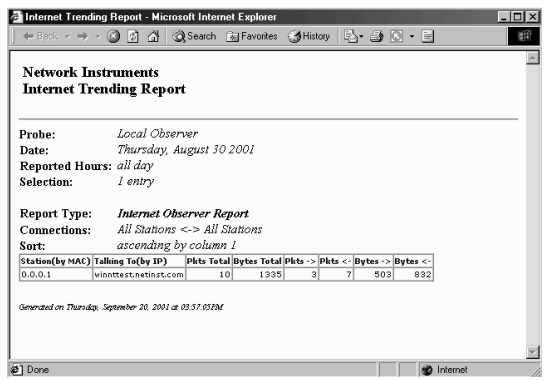
IP Subprotocols

Displays the packet distribution among IP subprotocols of the station.

It is possible to select any line or lines in the report. By clicking on either the CONNECTION DETAILS, the STATION1 DETAILS, or the STATION2 DETAILS button, you can generate a report in the lower pane, including details for the requested information.



Selecting one or more lines in either pane and clicking on that pane's PRINTABLE REPORT button opens the report in a new browser window, ready to be printed.

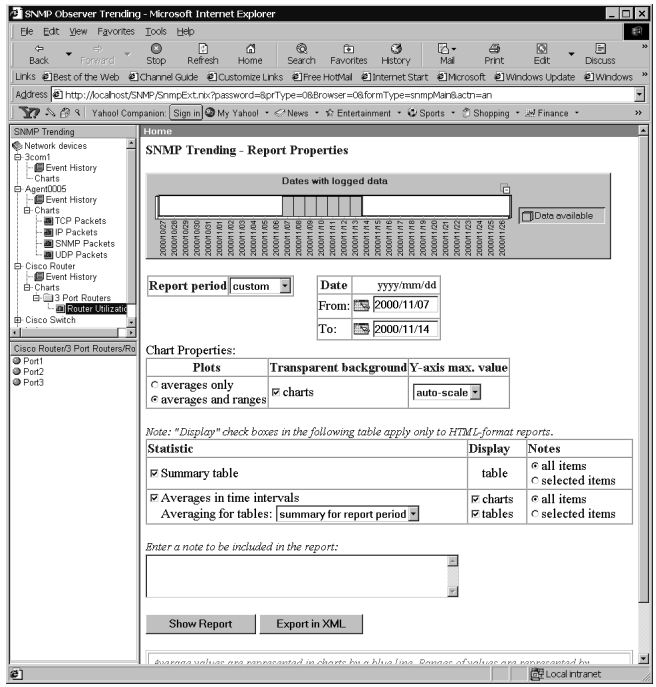


Click the PRINT button in the browser window to print the report.

SNMP Trending

Allows you to view SNMP trending data.

Click the SNMP TRENDING button on the **Web Publishing Service Welcome** page to display the **SNMP Trending Report Properties** page.



- "Dates with logged data" chart—displays the dates logged data is available for.
- "Report period" combo box—allows you to select the report period time. You can select either: 1 day, 1 week, 2 weeks, 1 month, or custom.
- "Date" calendars—allows you to select the day or dates you would like to run the report on.

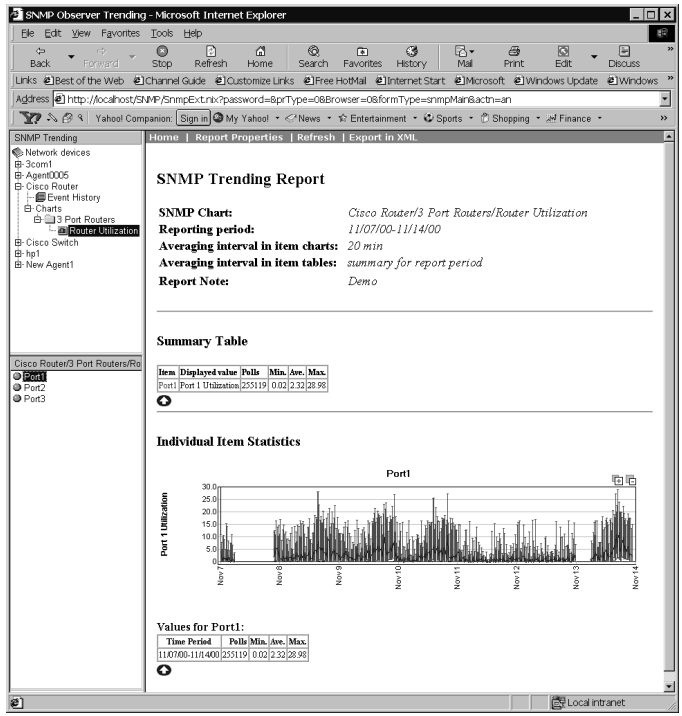
Chart Properties:

- Plots radio buttons—you can select "averages only" or "averages and ranges."
- "Charts" checkbox—you can select if you want to view the reports in a chart format.
- "Auto-scale" combo box—allows you to select the scale option.

Statistic:

- "Summary table" checkbox—if selected, the report will capture a summary of SNMP. The data will be displayed as a table. You can select to display all items or only selected items using the radio buttons in the "Notes" column.

- “Average in time intervals” checkbox—if selected, the report will capture the average in time intervals you have selected in the “Averaging for tables” combo box. You can select the data to be displayed as a chart and/or a table. You may also select to display all items or only selected items using the radio buttons in the “Notes” column.
- “Enter a note to include in the report” textbox—allows you to enter a note for inclusion in the report.
- Show Report button—generates the report and displays the Trending Report page.
- Export in XML button—exports the report to XML.


SNMP Observer Trending - Microsoft Internet Explorer
SNMP Trending
Home | Report Properties | Refresh | Export in XML
SNMP Trending Report
SNMP Chart: Cisco Router/3 Port Routers/Router Utilization
Reporting period: 11/07/00-11/14/00
Averaging interval in item charts: 20 min
Averaging interval in item tables: summary for report period
Report Note: Demo
Summary Table
Item | Displayed value | Polls | Min. | Ave. | Max.
Port1 | Port 1 Utilization | 255119 | 0.02 | 2.32 | 28.98
Individual Item Statistics
Port1
Port 1 Utilization
Values for Port1:
Time Period | Polls | Min. | Ave. | Max.
11/07/00-11/14/00 | 255119 | 0.02 | 2.32 | 28.98

The report has two parts:

- Summary Section—contains a tabular summary of the report. Each item in the summary table section represents one report item, and is also hotlinked to the chart or table that it represents. Clicking on the item will bring you directly to the chart or table it represents.
- Report Items—contains the actual chart or table report items, as configured with the Report Properties button. Each section also contains a icon, which is hotlinked to the contents section. Clicking on the icon will bring you back to the summary section.

Creating Comparison Reports

The procedure for creating comparison reports is identical to that for creating summary reports with one difference: instead of choosing one time range for summary, you choose two ranges to compare to each other.

Observer Suite: RMON Console

RMON Console is a part of Network Instruments' Observer Suite bringing the RMON (Remote Monitoring) standard to the Observer console.

Introduction to the RMON Console

Observer Suite's RMON Console allows you to view any RMON1/2 Probe's RMON data from within the Observer interface. The RMON data can be viewed in familiar Observer mode formats or in a pure RMON1/2 table format.

Viewing RMON data in Observer's familiar mode format lets you see your Probe's data without trying to decipher the complexity of the different RMON variables and RMON variable formats. Note that not all Observer modes are available using RMON because of the standards-based nature of the RMON data.

If the RMON Request for Comments (RFCs) do not provide a specific metric for Observer, then it cannot be displayed. Notes on what standard Observer mode metrics are missing can be found later in this section. See "RMON Modes" on page 416.

If you need to view all RMON variables in their native format, the RMON table provides a complete RMON data listing.

With Observer and the RMON Extension you can:

- View any RMON1/2 Probe's data from within the Observer interface.
- Manage any RMON enabled device from within Observer.

Using the RMON Console

Once Observer Suite has been activated (by entering the appropriate license numbers), Observer is ready to make a connection to an RMON Probe.

Connecting to a Probe

Unlike using an Advanced Observer Probe, when using RMON Probes, the Observer console must initiate a connection to the Probe.

A number of parameters are required to initiate the connection. Start by selecting Actions > Add RMON Probe from Observer's main menu. This will display the **RMON Probe Configuration** dialog. To initiate a connection, you must enter an IP address of the

RMON Probe and modify the read and write community string (if necessary). Once this information is entered, click on the OK button.

RMON Console Configuration Options

See “Adding/Configuring an RMON Probe” on page 263.

RMON Modes

Once a connection to an RMON Probe is made, you can view the RMON Probe’s data in a number of familiar Observer formats. The Observer modes that are supported for RMON Probes are:

- Packet Capture
- Packet View (Decode)
- Bandwidth Utilization
- Utilization History
- Utilization Thermometer
- Network Activity Display
- Vital Signs
- Top Talkers
- Pair Statistics (Matrix)
- Web Observer
- Router Observer
- Protocol Statistics
- IP Subprotocols
- IPX Subprotocols
- Discover Network Names
- Triggers and Alarms

Most RMON modes are identical to their Observer Advanced Probe counterparts. For all modes, subtractions, additions, and notes (if any) follow.

Packet Capture Mode

- Comparative Standard Observer Mode Functionality: Identical
- RMON Limitations: Filters are subject to your Probe’s ability to create offsets; dropped packets are not shown. When transferring packet buffers from the RMON Probe to Observer, the buffer is transferred one packet at a time (as per the RMON

standard). Filtering by layer 3 IP address is not supported by the RMON standard. See “Filter Setup for Selected Probe” on page 219.

Packet View (Decode)

- Comparative Standard Observer Mode Functionality: Identical
- RMON Limitations: Live decodes are not supported. Buffer transfers will be much slower than using an Advanced Probe. RMON does not allow block packet transfers.

Bandwidth Utilization Mode

- Comparative Standard Observer Mode Functionality: Identical
- RMON Limitations: None

Utilization History Mode

- Comparative Standard Observer Mode Functionality: Identical
- RMON Limitations: None

Utilization Thermometer

- Comparative Standard Observer Mode Functionality: Identical
- RMON Limitations: None

Network Activity Display Mode

- Comparative Standard Observer Mode Functionality: Identical
- RMON Limitations: None

Network Vital Signs Mode

- Comparative Standard Observer Mode Functionality: Similar
- RMON Limitations: Collisions and the Collision Expert are not supported.
- Notes: The collection of errors for any Probe is limited to the completeness and accuracy of the error tracking on the Probe. Observer’s RMON Console simply reports what is found on the RMON Probe.

Top Talkers Statistics Mode

- Comparative Standard Observer Mode Functionality: Identical
- RMON Limitations: None

Pair Statistics (Matrix) Mode

- Comparative Standard Observer Mode Functionality: Similar
- RMON Limitations: Pair latencies are not calculated.

Web Observer Mode

- Comparative Standard Observer Mode Functionality: Similar
- RMON Limitations: No ping test is available in RMON.

Router Observer Mode

- Comparative Standard Observer Mode Functionality: Identical
- RMON Limitations: None

Protocol Distribution Mode

- Comparative Standard Observer Mode Functionality: Identical
- RMON Limitations: None

IP Subprotocols

- Comparative Standard Observer Mode Functionality: Identical
- RMON Limitations: None

IPX Subprotocols

- Comparative Standard Observer Mode Functionality: Identical
- RMON Limitations: None

Discover Network Names Mode

- Comparative Standard Observer Mode Functionality: Similar
- RMON Limitations: No IPX or Microsoft discovery is available.
- Notes: Discover Network Names active discovery works in a slightly different manner in RMON mode. The active process is split between the Observer console and the RMON Probe. Initially, the Observer console pings the address range set in the discovery setup. The Probe then collects the response packets and stores them on the address list. Passive discovery is identical.

Triggers and Alarms Mode

- Comparative Standard Observer Mode Functionality: Only standard RMON RFC Statistics Group items are triggered on. These include:

For Ethernet

Packet Size 64 Byte Packets
Packet Size 65-127 Byte Packets
Packet Size 128-255 Byte Packets
Packet Size 256-511 Byte Packets
Packet Size 512-1023 Byte Packets

Packet Size 1024-1518 Byte Packets
Broadcast Packets
Bytes
Collisions
CRC & Alignment Errors
Fragments
Jabbers
Multicast Packets
Occurrence of Hardware Address
Oversized Packets
Packets
Sequence of Bytes at an Offset
Undersized Packets

For Token Ring

Packet Size 18-63 Byte Packets
Packet Size 64-127 Byte Packets
Packet Size 128-255 Byte Packets
Packet Size 256-511 Byte Packets
Packet Size 512-1023 Byte Packets
Packet Size 1024-2047 Byte Packets
Packet Size 2048-4095 Byte Packets
Packet Size 4096-8191 Byte Packets
Packet Size 8192-18000 Byte Packets
Packet Size >18000 Byte Packets
Abort Errors
AC Errors
Beacon Events
Beacon Packets
Beacon Time
Burst Errors
Claim Token Events
Claim Token Packets
Congestion Errors
Data Broadcast Packets
Data Bytes
Data Multicast Packets
Data Packets
Frame Copied Errors
Frequency Errors
Internal Errors
Line Errors
Lost Frame Errors
MAC Bytes
MAC Packets

NAUN Changes
Occurrence of Hardware Address
Ring Poll Events
Ring Purge Events
Ring Purge Packets
Sequence of Bytes at an Offset
Soft Error Reports
Token Errors

- Actions are identical to Observer's standard actions.
- RMON Limitations: Only statistics kept in the statistics group (RMON1 Group 1) are triggered upon.
- Notes: The following information on each statistics group 1 item is taken directly from the RMON1 MIB. Each vendor's RMON implementation should follow the described metric for each item. RMON timing for any trigger that tracks a time interval is 1/100th of a second. Additionally, each trigger (except the Occurrence of a hardware address and the Sequence of bytes at an offset) allows configuration to trigger on either a specific value floor or ceiling, a floor or ceiling value per second, or a floor or ceiling delta between sampling periods.

RMON Ethernet Triggers

Packet Size 64 Byte Packets

The number of packets (including bad packets) received that were 64 octets in length (excluding framing bits, but including FCS octets).

Packet Size 65-127 Byte Packets

The number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive (excluding framing bits, but including FCS octets).

Packet Size 128-255 Byte Packets

The number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive (excluding framing bits, but including FCS octets).

Packet Size 256-511 Byte Packets

The number of packets (including bad packets) received that were between 256 and 511 octets in length inclusive (excluding framing bits, but including FCS octets).

Packet Size 512-1023 Byte Packets

The number of packets (including bad packets) received that were between 512 and 1023 octets in length inclusive (excluding framing bits, but including FCS octets).

Packet Size 1024-1518 Byte Packets

The number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive (excluding framing bits, but including FCS octets).

Broadcast Packets

The number of good packets received that were directed to the broadcast address. Note that this does not include multicast packets.

Bytes

The number of octets (1 octet = 1 byte) of data (including those in bad packets) received on the network (excluding framing bits, but including FCS octets). This trigger can be used as a reasonable estimate of Ethernet utilization.

Setting up an RMON Utilization Trigger

In the Actions dialog, select a “Sampling Interval” that reflects the amount of time (in seconds) that you would like to average data over. For example, a Sampling Interval of one second will track the network traffic for one second prior to comparing the upper and lower thresholds. Set the value for lower threshold to 1 byte less than the upper threshold. Use the following values for the upper threshold with the following utilizations:

10-Mbit Ethernet:

10%	125000
20%	250000
30%	375000
40%	500000
50%	625000
60%	750000
70%	875000
80%	1000000
90%	1125000
100%	1250000

100-Mbit Ethernet:

10%	12500000
20%	25000000

30%	37500000
40%	50000000
50%	62500000
60%	75000000
70%	87500000
80%	100000000
90%	112500000
100%	125000000

Note: The RMON standard does not consider an event to happen unless both Upper and Lower Thresholds have been crossed.

Collisions

Collisions show the best estimate of the number of collisions on this Ethernet segment. The value returned will depend on the location of the RMON Probe. Section 8.2.1.3 (10BASE-5) and section 10.3.1.3 (10BASE-2) of IEEE standard 802.3 states that a station must detect a collision, in the receive mode, if three or more stations are transmitting simultaneously. A repeater port must detect a collision when two or more stations are transmitting simultaneously. Thus, a Probe placed on a repeater port could record more collisions than a Probe connected to a station on the same segment would.

Probe location plays a much smaller role when considering 10BASE-T. 14.2.1.4 (10BASE-T) of IEEE standard 802.3 defines a collision as the simultaneous presence of signals on the DO and RD circuits (transmitting and receiving at the same time). A 10BASE-T station can only detect collisions when it is transmitting. Thus, Probes placed on a station and a repeater, should report the same number of collisions.

Note: An RMON Probe inside a repeater should ideally report collisions between the repeater and one or more other hosts (transmit collisions as defined by IEEE 802.3k), plus receiver collisions observed on any coax segments to which the repeater is connected.

CRC & Alignment Errors

The number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).

Fragments

The number of packets received that were less than 64 octets in length (excluding framing bits, but including FCS octets) and had either a bad Frame Check Sequence (FCS) with an

integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).

> **Note:** It is entirely normal for etherStatsFragments to increment. This is because it counts both runts (which are normal occurrences due to collisions) and noise hits.

Jabbers

The number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).

> **Note:** This definition of jabber is different than the definition in IEEE-802.3 section 8.2.1.5 (10BASE5) and section 10.3.1.4 (10BASE2). These documents define jabber as the condition where any packet exceeds 20 ms. The allowed range to detect jabber is between 20 ms and 150 ms.

Multicast Packets

The number of good packets received that were directed to a multicast address. Note that this number does not include packets directed to the broadcast address.

Occurrence of Hardware Address

The occurrence of a hardware address specified in the Actions dialog. The addresses are listed from the local or remote address table. This table can be viewed or edited in either the “Discover Network Names” mode dialog, or the “Filter” dialog.

> **Note**: This trigger is only available using Network Instruments’ RMON2 Probe.

Oversized Packets

The number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets) and were otherwise well formed.

Packets

The number of packets (including bad packets, broadcast packets, and multicast packets) received.

Sequence of Bytes at an Offset

The occurrence of a sequence of bytes at a specified offset. The format of the offset is a decimal number representing the number of bytes “offset” or from the beginning of a packet. The bytes defined must be defined in hex with a space between each set of characters.

For example, if you define an offset-sequencing trigger to look for telnet packets (i.e., looking for TCP port 23), the offset would be 34 —14 bytes of Ethernet heading + 20 more bytes of IP header, and the sequence would be 00 17 — port 23 in hex.

See the section on active highlighting (in the Packet View sections of the manual) for help on creating offsets.

> **Note:** This trigger is only available using Network Instruments' RMON2 Probe.

Undersized Packets

The number of packets received that were less than 64 octets long (excluding framing bits, but including FCS octets) and were otherwise well formed.

RMON Token Ring Triggers

Packet Size 18-63 Byte Packets

The number of good non-MAC frames received that were between 18 and 63 octets in length inclusive, excluding framing bits, but including FCS octets.

Packet Size 64-127 Byte Packets

The number of good non-MAC frames received that were between 64 and 127 octets in length inclusive, excluding framing bits, but including FCS octets.

Packet Size 128-255 Byte Packets

The number of good non-MAC frames received that were between 128 and 255 octets in length inclusive, excluding framing bits, but including FCS octets.

Packet Size 256-511 Byte Packets

The number of good non-MAC frames received that were between 256 and 511 octets in length inclusive, excluding framing bits, but including FCS octets.

Packet Size 512-1023 Byte Packets

The number of good non-MAC frames received that were between 512 and 1023 octets in length inclusive, excluding framing bits, but including FCS octets.

Packet Size 1024-2047 Byte Packets

The number of good non-MAC frames received that were between 1024 and 2047 octets in length inclusive, excluding framing bits, but including FCS octets.

Packet Size 2048-4095 Byte Packets

The number of good non-MAC frames received that were between 2048 and 4095 octets in length inclusive, excluding framing bits, but including FCS octets.

Packet Size 4096-8191 Byte Packets

The number of good non-MAC frames received that were between 4096 and 8191 octets in length inclusive, excluding framing bits, but including FCS octets.

Packet Size 8192-18000 Byte Packets

The number of good non-MAC frames received that were between 8192 and 18000 octets in length inclusive, excluding framing bits, but including FCS octets.

Packet Size >18000 Byte Packets

The number of good non-MAC frames received that were greater than 18000 octets in length, excluding framing bits, but including FCS octets.

Abort Errors

The number of abort delimiters reported in error reporting packets detected by the Probe.

AC Errors

The number of AC (Address Copied) errors reported in error reporting packets detected by the Probe.

Beacon Events

The number of times that the ring enters a beaconing state (beaconFrameStreamingState, beaconBitStreamingState, beaconSetRecoveryModeState, or beaconRingSignalLossState) from a non-beaconing state. Note that a change of the source address of the beacon packet does not constitute a new beacon event.

Beacon Packets

The number of beacon MAC packets detected by the Probe.

Beacon Time

The amount of time that the ring has been in the beaconing state. The time interval recorded is in 1/100 of a second.

Burst Errors

The number of burst errors reported in error reporting packets detected by the Probe.

Claim Token Events

The number of times that the ring enters the claim token state from normal ring state or ring purge state. The claim token state that comes in response to a beacon state is not counted.

Claim Token Packets

The number of claim token MAC packets detected by the Probe.

Congestion Errors

The number of receive congestion errors reported in error reporting packets detected by the Probe.

Data Broadcast Packets

The number of good non-MAC frames received that were directed to an LLC broadcast address (0xFFFFFFFFFFFF or 0xC000FFFFFFFF).

Data Bytes

The number of bytes of data in good frames received on the network (excluding framing bits but including FCS octets) in non-MAC packets.

Data Multicast Packets

The number of good non-MAC frames received that were directed to a local or global multicast or functional address. Note that this number does not include packets directed to the broadcast address.

Data Packets

The number of non-MAC packets in good frames received on the network.

Frame Copied Errors

The number of frame copied errors reported in error reporting packets detected by the Probe.

Frequency Errors

The number of frequency errors reported in error reporting packets detected by the Probe.

Internal Errors

The number of adapter internal errors reported in error reporting packets detected by the Probe.

Line Errors

The number of line errors reported in error reporting packets detected by the Probe.

Lost Frame Errors

The number of lost frame errors reported in error reporting packets detected by the Probe.

MAC Bytes

The number of octets (bytes) of data in MAC packets (excluding those that were not good frames) received on the network (excluding framing bits, but including FCS octets).

MAC Packets

The number of MAC packets (excluding packets that were not good frames) received.

NAUN Changes

The total number of NAUN changes detected by the Probe.

Occurrence of Hardware Address

The occurrence of a hardware address specified in the Actions dialog. The addresses are listed from the local or remote address table. This table can be viewed or edited in either the “Discover Network Names” mode dialog, or the “Filter” dialog.

> **Note:** This trigger is only available using Network Instruments' RMON2 Probe.

Ring Poll Events

The number of ring poll events detected by the Probe (i.e., the number of ring polls initiated by the active monitor that were detected).

Ring Purge Events

The number of times that the ring enters the ring purge state from normal ring state. The ring purge state that comes in response to the claim token or beacon state is not counted.

Ring Purge Packets

The number of ring purge MAC packets detected by the Probe.

Sequence of Bytes at an Offset

The occurrence of a sequence of bytes at a specified offset. The format of the offset is a decimal number representing the number of bytes “offset” or from the beginning of a packet. The bytes defined must be defined in hex with a space between each set of characters.

For example, if you define an offset-sequencing trigger to look for telnet packets (i.e., looking for TCP port 23), the offset would be 42 if no Token Ring source routing information is in the packet, and the sequence would be 00 17 — port 23 in hex.

See the section on active highlighting (in the Packet View sections of the manual) for help on creating offsets.

- Note: This trigger will only be available using Network Instruments’ RMON2 Probe.

Soft Error Reports

The number of soft error report frames detected by the Probe.

Token Errors

The number of token errors reported in error reporting packets detected by the Probe.

RMON Table

The RMON table is provided for viewing raw RMON data exactly as it is stored on the RMON Probe. Most tables and indices are not directly useful in this view. These values are most likely to be used for verification or troubleshooting purposes. Each of the 19 RMON1/2 groups are available.

DICOM Extension

Introduction to DICOM

The Informationstechnische Dienstleistung division of Siemens AG in Germany has developed, in cooperation with Network Instruments, a DICOM Extension for Observer. This Console decodes and analyzes the interaction procedures for medical/technical equipment which utilizes DICOM (Digital Imaging and Communications in Medicine standard).

The DICOM standard is a specification for packet structure, as well as a communication definition for exchanging data between medical equipment. DICOM relies on industry standard network connections (TCP/IP) and is an efficient method for communicating digital images from diagnostic devices to display systems. DICOM is used for CT and MR including: Nuclear Medicine, Ultrasound, Computed Radiography, Digitized Film, Video Capture, HIS/RIS information, and connections between networked hardcopy output devices.

The DICOM protocol was developed through a joint effort between potential users and the companies that manufacture medical imaging equipment. The development of a decoder module for a protocol analyzer based on a standard Microsoft platform (PC or notebook) targets the need for a technician to carry an affordable, portable DICOM diagnostic tool. Observer's ease of use, and the addition of DICOM decoding, provides a quick and efficient troubleshooting tool that technicians can utilize to pinpoint malfunctions in networked medical environments.

Networks may have many problems and/or configuration issues which can cause downtime, some of which may be DICOM-related problems. New network installations or network additions in such environments often produce system malfunctions and hardware mismatches. These malfunctions can be due to ongoing network traffic problems or even incompatible systems from different vendors causing communication failures. Observer DICOM provides a technician or administrator with an inexpensive tool that covers both general (network) and specific (DICOM) troubleshooting demands—getting your network back up and running as fast as possible.

Functionality

Observer's DICOM Protocol Decode and Packet View is shown in three ways:

- Raw Data TCP Packets—the DICOM data within the TCP packets is displayed in hexadecimal.

- PDUs of DICOM Upper Layer Protocol—Observer's Packet Summary window shows captured PDUs of DICOM Upper Layer Protocol in order of appearance. Selected PDUs can then be decoded and displayed.
- DICOM Messages—command and data messages are sorted, and selected messages are decoded and displayed. Because the raw data and the decode are displayed simultaneously, they can be compared line by line.

Decode

- DICOM Upper Layer and DICOM Messages are decoded. Decode of private data elements is also possible through a user-defined text file.

Error Display

- Type check of single data elements.

Licensing

Observer DICOM is licensed for one PC (or one laptop) on one network at one site. If Observer DICOM is to be loaded on a laptop, a separate license for each laptop is required.

You may upgrade an existing copy of Observer or Distributed Observer to Observer DICOM (or Distributed Observer DICOM) by obtaining DICOM-specific activation numbers from Network Instruments or your Network Instruments' distributor or dealer. The DICOM upgrade Console is a "for charge" upgrade. Pricing depends on the geographical area you are located in—please contact Network Instruments for specific pricing information regarding the DICOM Extension.

Capturing Data in Observer's DICOM Extension

Observer DICOM obtains its (DICOM) data from Observer's Packet Capture buffer. All the packets that have been captured in Observer can also be transferred to Observer DICOM mode. Observer DICOM mode filters the data with a DICOM post-filter that is configured in Address Filter Setup. See "Capture in the Packet Capture Window" on page 430. This filtering ensures that the DICOM communication is always apparent.

Data can be captured in three different ways:

- Capture in the packet capture window.
- Capture in the Observer DICOM window.
- Importing a capture buffer.

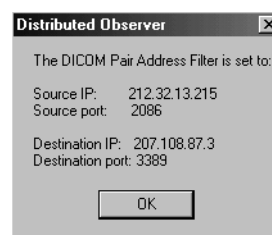
Capture in the Packet Capture Window

The following steps are necessary:

1. Start Observer.
2. Open the Packet Capture window by selecting Capture > Packet Capture. This view shows you whether or not all the packets have been captured, how full the capture buffer is at any given time, and whether any low-level communication errors have occurred (depending on the NIC).
3. Check, and if necessary, alter the setups (i.e., pre-filter, buffer size) by clicking on the SETUP icon.
4. To begin the capture, select Mode Commands > Start Mode or click on the START icon.
5. As soon as you have acquired a sufficient number of captures, select Mode Commands > Stop or click on the STOP icon to stop the capture process.

If the IP addresses of the communication partners are unknown or if you want to derive them automatically from a TCP packet:

1. Change to the Observer Standard Decode view in Mode Commands > View or click on the VIEW icon.
2. Mark a TCP packet belonging to the communication you want to decode.
3. Select Mode Commands > Automatic DICOM Address Pair Setup to set the addresses and ports of the communication partners for the DICOM post-filter automatically.

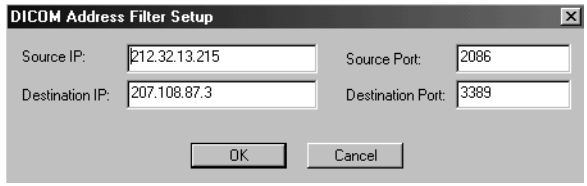


4. Click on the OK button.
5. You can now change to the DICOM window with Mode Commands > Start DICOM Decode or click on the DECODE icon.

If the IP addresses are known:

1. Select Mode Commands > Start DICOM Decode.

2. Select Mode Commands > Select IP Address Pair to open the **DICOM Address Filter Setup** dialog.



3. Enter the source IP address, the destination IP address, and the ports.
4. Click the OK button.

Capture in the Observer DICOM Window

Only DICOM data that has already passed through the DICOM filter is displayed in this window. All the communication packets that pass through a pre-filter (assuming one is active) are acquired in the capture buffer, regardless of whether or not they contain any DICOM data.

The following steps are necessary:

1. Start Observer.
2. Select Start Modes > Packet Capture.
3. Check, and if necessary, alter the setups (i.e., pre-filter, buffer size) by clicking on the SETUP icon.
4. Select Mode Commands > Start DICOM Decode.
5. Select Mode Commands > Select IP Address Pair.
6. Enter the source IP address and the destination IP address. Set the destination port to 0 and specify the known port as the source port.
7. Select Mode Commands > Start Mode. You can now follow the setup procedure for your DICOM communication online.
8. As soon as you have acquired enough data, select Mode Commands > Stop to stop the capture process.

Importing a Capture Buffer

The capture file must be available in a format that is supported by Observer (i.e., Observer bar or Sniffer format).

The following steps are necessary:

1. Start Observer.
2. Select File > Load and Analyze Observer Capture Buffer.

3. Select a *.BFR file.
4. Confirm your selection with “Open.”

If the IP addresses of the communication partners are unknown or if you want to derive them automatically from a TCP packet:

1. Change to the Observer Standard Decode view in Mode Commands > View.
2. Mark a TCP packet belonging to the communication you want to decode.
3. Select Mode Commands > Automatic DICOM Address Pair Filter Setup to set the addresses and ports of the communication partners for the DICOM post-filter automatically.
4. You can now change to the DICOM window with Mode Commands > Start DICOM Decode.

If the IP addresses are known:

1. Select Mode Commands > Start DICOM Decode.
2. Select Mode Commands > Select IP Address Pair to open the DICOM Address Filter Setup window.
3. Enter the source IP address, the destination IP address, and the ports.

DICOM Extension Decode Window

The DICOM window contains its own Mode Menu, similar to that of Observer itself. This menu contains all of the actions that can be selected in DICOM mode. The button bar on the left edge of the window offers exactly the same functionality, as well as explaining the meanings of the buttons.

The first three entries (Start Mode, Stop, and Clear) are linked to the Packet Capture and Decode windows of Observer (i.e., if you select one of these entries in either of these windows, the action is also effective in the other window).

Observer DICOM Address Filter Setup (Select IP Address Pair)

You must enter the communication partners whose DICOM communications you want to decode in this menu. They can be generated automatically in the Observer Decode window by marking a TCP packet for DICOM communication and then selecting Mode Commands > Automatic DICOM Address Pair Setup.

If you set the destination port to 0, this port is ignored. The specified source port is compared with the source and destination ports for the packets in the Observer buffer and processed if they match.

Evaluating Data in Observer's DICOM Extension

In order to be able to represent and evaluate a DICOM communication, the data must be captured in Observer DICOM.

After you have captured the data, you will see either the DICOM Upper Layer Protocol View or the DICOM Message View. You can toggle between these two views at any time either in Mode Commands or by using the button bar on the left edge of the screen.

Both of the views have a button bar (Mode Commands) on the left, a combined navigation/information bar at the top, and three superimposed output windows with a freely definable size.

You can toggle between the two views (DICOM Upper Layer Protocol View and DICOM Message View) by clicking on the appropriate buttons in the button bar, which also contains buttons for the other functions in the Mode Commands (see description of the functions in the Observer DICOM window above).

The left part of the combined navigation/information bar contains icons for navigating between the different packets (first packet, last packet, up/down 100 packets, up/down one screen, up/down one packet). The right part shows the total number of packets available for decoding, the IP source address, the IP destination address and the TCP ports used for DICOM in your communication. Your current position in the communication packet relative to the start (start = 0) is indicated on the far right.

The top output window contains a list of your communication packets, with details of the packet number (Pkt), the communication direction (Direction), the packet type (Type), additional information (Information) and the packet size in bytes (Size). The packet, which is selected in the top output window (shown on a colored background), is displayed in its decoded form in the middle window. Lines marked with a + can be expanded (position the mouse pointer on the + and press the left mouse button), while lines marked with a - cannot. The bottom output window contains a hexadecimal view of the packet, which is selected in the top window. The bytes corresponding to the line that is selected in the middle output window (colored background) are also highlighted in the bottom window. The three output windows thus offer the following information for evaluation (from top to bottom):

(top) DICOM packets
(middle) decoded DICOM information
(bottom) raw DICOM data

DICOM Data Dictionary Extensions

To extend the Data Dictionary, simply open the file <Observer-program-folder>\Data.dic using any text editor, e.g., Notepad.exe.

Then enter your extensions in accordance with the following syntax:

TAG;DESCRIPTION;VALUE REPRESENTATION;VALUE Multiplicity

The ‘;’ character acts as a delimiter.

- Tag—two WORDS separated by a comma

  Example: 0008,0016

- Description—text that is displayed when the data is decoded.

  Example: SOP Class UID

- Value Representation (VR)—how the data field should be interpreted if it is not specified explicitly.

  Example: UI

- Value Multiplicity (VM)—not evaluated at present. Can be omitted together with the final delimiter.

  Example: 1-n

With Value Multiplicity	0008,0016;SOP Class UID;UI;1
Without Value Multiplicity	0008,0016;SOP Class UID;UI

Important Things to Note

- The maximum permitted line length is 120 characters.
- All tags that are not listed in the Data.dic file are represented as Unknown Tag.
- Blank lines are not interpreted.
- Lines beginning with a # (comment lines) are not interpreted.
- If a tag is defined more than once, only the first tag in the list is evaluated.

DICOM UID Dictionary Extensions

To extend the UID Dictionary, simply open the file <Observer-program-folder>\Uid.dic using any text editor, e.g. Notepad.exe.

Then enter your extensions in accordance with the following syntax:

UID;Description

The ‘;’ character acts as a delimiter.

- UID—Unique identifier, up to 64 characters (the numbers 0 to 9 and the “,” character are allowed).

  Example: 1.2.840.10008.1.1

- Description—text that is displayed when the data is decoded; all control characters are ignored (e.g., Tab).

Example: Verification SOP Class

Example: 1.2.840.10008.1.1;Verification SOP Class

Important Things to Note:

- The maximum permitted line length is 200 characters.
- All UIDs that are not listed in the Uid.dic file are represented as Unknown UID.
- Blank lines are not interpreted.
- Lines beginning with a # (comment lines) are not interpreted.
- If a UID is defined more than once, only the first UID in the list is evaluated.

Troubleshooting DICOM Extension Problems

Errors	**Possible Cause**
No packets either in DICOM Message View or in DICOM Upper Layer Protocol View	• Invalid station addresses specified • Invalid TCP port specified for DICOM • Capture started too late (after DICOM communication set up) • Capture Partial Packet set (in Observer Decode window) • Use Circular Packet Buffer activated (in Observer Decode Window • TCP/IP error
Incomplete communication	• Capture buffer too small (check in main Packet Capture window) • Packets lost during capture (check in main Packet Capture window) • Decoding interrupted when new connection set up • TCP/IP error

Troubleshooting

General Principles

Although most installations of Observer will proceed without any trouble, due to the vast number of network configurations and PC hardware/software options that Observer supports, sometimes trouble arises.

If you experience trouble in setting up Observer, keep a number of things in mind.

- Try to simplify your setup in any way possible. This means if you have a screen saver loaded, disable it. If you are running some fancy network add on peer-to-peer jet engine turbo stimulator, remove it. This does not mean that you will not be able to use Observer with your other products, but if you can determine where the problem is, you can focus on that piece of the puzzle and you may be well on your way to solving the problem.
- Don't trust anyone or anything. The only way to really know what your hardware settings are is to have the card or device in one hand and the manual in the other. Programs that try to discover interrupts and other settings only function properly when everything is working correctly—exactly when you don't need them. Don't blindly trust other network drivers—they may or may not be reporting the correct information.
- Do not, under any circumstances, share interrupts, i/o ports, or memory addresses between adapters. No matter what has worked before or what might work in the future, sharing interrupts or memory settings is not a valid configuration.

Troubleshooting Checklist

- Does your network work without any Observer programs or drivers loaded? If not, check your network installation instructions. Once your network appears to be running correctly, try to install Observer again.
- Try installing Observer on a different PC to see if you experience the same problem. This does not mean that you will not be able to use Observer on the desired PC. It may give you some insight into the problem that you are having.
- Look on the Network Instruments' Web site under "Support"—your problem may already be solved and documented.

Specific Issues

NDIS

Observer is reporting that your network adapter card does not support promiscuous mode.

- Contact your network card adapter manufacturer and see if they support promiscuous mode for the card and driver you own.
- If you cannot get in touch with the network card manufacturer, try downloading the latest driver from the network card manufacturer's Web page. Very often, card manufacturers do not include promiscuous mode in an initial release of a driver, but add it in later releases.

ODI

Observer is not "seeing" the packet types that you are interested in.

Check to make sure that you have included the correct FRAME line in your NET.CFG.

Observer is not accepting packets on your network.

- Are you licensed?

  See the "Licensing" section in this manual for information on turning a DEMO version of Observer into a licensed product. You can tell the state of your license by clicking on Help > About Observer.

- Do you have the correct filter(s) set? Check the "Filter" dialog to verify the active filter set.

  When setting up a to/from filter, you should set the address of interest in the left side of the filter box and ANY_ADDRESS in the right section. Then select "´."You should not put the desired address in both sides of the filter.

General

Problems with PCMCIA adapters

If you are running Observer on a laptop with a PCMCIA adapter and things do not seem to be working correctly, try to run Observer from a standard desktop PC.

If Observer works from the desktop PC and not the laptop, you can assume that the PCMCIA adapter either does not support promiscuous mode or the drivers claim to support promiscuous mode but do not.

For both cases, contact the manufacturer of the PCMCIA adapter and ask if they have drivers that support promiscuous mode.

Load Driver Could Not Open VMONI1 Service

Observer is telling you that you have not installed the VMON50 Service under Windows. You will need to follow the instructions for installing Observer.

Problems Licensing Your Product

“My license numbers do not work”

- Make sure you are licensing the correct version of the product. License numbers are version specific, and will work within all equal major version numbers of a product. For example, the license number for Observer 7.0 will work with Observer 7.1, but not with Observer 8.0. To obtain a license number for a new version, please see the upgrade policy for that product, or contact Network Instruments or your local distributor. Note that identification numbers are based on your name and company name and do not change from product version to version or product to product.

The license number you received is based on the text that you typed in the name and company fields in the licensing dialog. You must type in your name and company EXACTLY as you see it printed on the RTU (Right To Use) certificate that was supplied to you. Each character, each space, each punctuation mark is used to create your customer identification number. The license number (for your product version) is based on your identification number

How do I connect Observer to a Probe across a Firewall?

To connect Observer to a Probe across a firewall, you need to manually configure the firewall to let Observer use specific ports.

Observer versions 8.0 and greater use ports 25901 and 25903 for all communication between Observer and an Advanced Probe. Therefore, you must configure the firewall to allow traffic on these ports. To use an RMON Probe, you must allow traffic on port 161.

Observer versions 7.x and lower used ports 901 and 903 to transfer data and commands between the Probe and the Observer console. As of version 8.0, ports 901 and 903 are only used (once) for upgrading version 7.x probes to the current version. It is only necessary to open up these ports if you have older version Probes on the other side of the firewall that need to be upgraded.

Observer Suite Custom Decode Kit

Introduction

Observer Suite's Custom Decode Kit gives an experienced C++ programmer the ability to add custom, proprietary, or additional protocols to Observer decodes.

The Custom Decode Kit is provided as a Microsoft Development Studio v6.0 C++ project. This project should be used as an example and template.

> The Custom Decode Kit is an add-on for Observer Suite and is not available with the basic Observer or Real-Time Expert products. To upgrade your Observer to the Observer Suite, please contact your Network Instruments' sales representative, dealer, or distributor.

Warranty

The Custom Decode Kit is provided "as is" and without any warranty. Network Instruments does not give technical support for the Custom Decode kit, instruction in C++ programming, or training on how to use the Custom Decode Kit.

Installation

To install the Custom Decode Kit, run CustomDecodeKit.exe. This will, by default, be found in the Observer's Drivers\CustomDecodeKit folder. Specify the location where you want to install the Custom Decode Kit.

> By default, it will install to C:\CustomDecodeKit

Run Microsoft Development Studio and open the CustomDecode project.

How the Custom Decode API Works

The Custom Decode API provides an interface that displays custom decodes in Observer's decode module. A custom decode is inserted in the protocol decode window (the middle pane in Observer's Decode and Analysis window).

The purpose of the Custom Decode DLL is to add lines to the Tree Control in Decode and Analysis.

The Custom Decode DLL entry point functions: CustomDecodeFrame(), CustomDecodeIP(), CustomDecodeUDP(), and CustomDecodeTCP() are called from Observer to permit a programmer to add a custom decode.

> For example, if you decide to write a decode for UDP port 8765, when your CustomDecodeUDP() function is called, you have to check in the UDP header whether or not the port is 8765.
>
> If it is, you do your decode, adding lines to the Tree Control in a way similar to the CustomDecode sample project. When you are finished, you return TRUE from CustomDecodeUDP().
>
> If the port is not 8765, just return FALSE from CustomDecodeUDP() and Observer will perform the default processing. See the CustomDecode sample project code for more details.

Using the Custom Decode Kit

The DLL code can be built using the Microsoft Development Studio C++ compiler. The DLL entry points are of “extern C” type for maximum compatibility.

> You can use any other C or C++ compiler as long as the entry point API function definitions are preserved intact and the functions are explicitly exported in a .def file.

A new decode DLL can be renamed to something other than CustomDecode.DLL by changing the output module name and a LIBRARY name in the CustomDecode.DEF file. It is necessary to use multiple, distinct names if Observer Suite is going to use multiple decode DLLs.

> Currently, Observer supports up to eight (8) simultaneously loaded custom decode DLLs.

The code can be written in generic C++ or the programmer can create a DLL project with MFC support and include in it CustomDecode.cpp, CustomDecode.h, CustomDecode.def, UserDefinedFunctions.cpp and UserDefinedFunctions.h. In this case, it will be necessary to name the project something other than CustomDecode and to delete the DllMain() function code from CustomDecode.cpp file.

Files Included

The CustomDecode project includes the following files:

CustomDecode.cpp, CustomDecode.h, and CustomDecode.def

These files include four entry point functions, defined as follows:

```
                //decode starting at a frame protocol header
extern “C” BOOL FAR PASCAL CustomDecodeFrame
                        void * pFrameStart,
```

```
                        void * pProtocolFieldStart,
                        long nProtocolLength,
                        long nOffsetFromBeginningOfPacket,
                        long nBitmapLevel,
                        DWORD dOpenTreeList,
                        HWND hwndTree,
                        void * pPrintStruct);


                //decode starting after IP protocol header
extern "C" BOOL FAR PASCAL CustomDecodeIP (
                        void * pIpHeaderStart,
                        void * pIpDataStart,
                        long nIpDataLength,
                        long nOffsetFromBeginningOfPacket,
                        long nBitmapLevel,
                        DWORD dOpenTreeList,
                        HWND hwndTree,
                        void * pPrintStruct);


                //decode starting after UDP protocol header
extern "C" BOOL FAR PASCAL CustomDecodeUDP (
                        void * pUdpHeaderStart,
                        void * pUdpDataStart,
                        long nUdpDataLength,
                        long nOffsetFromBeginningOfPacket,
                        long nBitmapLevel,
                        DWORD dOpenTreeList,
                        HWND hwndTree,
                        void * pPrintStruct);

                //decode starting after TCP protocol header
extern "C" BOOL FAR PASCAL CustomDecodeTCP (
                        void * pTcpHeaderStart,
                        void * pTcpDataStart,
                        long nTcpDataLength,
                        long nOffsetFromBeginningOfPacket,
                        long nBitmapLevel,
                        DWORD dOpenTreeList,
                        HWND hwndTree,
                        void * pPrintStruct);
```

In addition, the files include helper functions used in the user-defined sections of the code.

UserDefinedFunctions.cpp and UserDefinedFunctions.h

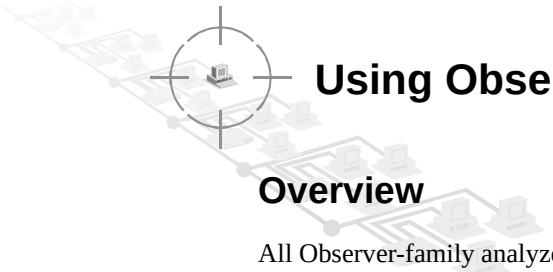
These files include the user code. They contain implementation functions that map all four functions onto user modifiable functions. They also contain a very simple example decode in the SimpleDecodeSample() function.

StdAfx.cpp and StdAfx.h

These are the standard Microsoft Development Studio AFX files.

> Only an experienced C++ programmer should modify any of the source files in the Observer Suite Custom Decode Kit.

Please refer to code comments for explanations about particular functions.



Using Observer from HP OpenView

Overview

All Observer-family analyzers include the tools you need to integrate Observer into Hewlett-Packard's OpenView administrative interface. This will allow you to see and control Observer-equipped PCs from the HP OpenView administrative interface.

For details on how to integrate Observer products with HP OpenView, please see the HPOV_Integration_Readme.html located in the HPOV_Integration directory which is located in your Observer install directory.

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